The Australian Tertiary Mollusca of the Family Turridae

By A. W. B. POWELL, Assistant-Director.

This paper is based upon an extensive collection of Australian Tertiary Turridae put together by Dr. H. J. Finlay of Wellington. The collection is augmented by material from Dr. C. R. Laws, of Auckland, as well as series collected by Dr. R. S. Allan, of Christchurch, Mr. W. J. Parr, of Melbourne, and the writer. All this material, including the holotypes, is now in the Auckland Museum.

In 1943 (Bulletin of the Auckland Institute and Museum, No. 2) the writer published "The New Zealand Recent and Fossil Mollusca of the Family Turridae." The present paper should be studied in conjunction with the New Zealand monograph, for a basis of comparison exists, particularly in respect to the Middle and Lower Miocene, which are well represented in both countries.

The recognition in the Australian Miocene of such characteristic New Zealand genera as *Austrotoma, Zemacies, Insolentia, Comitas, Carinacomitas, Hauturua* and *Rugobela* is noteworthy. A table is given which shows at a glance the composition and certain interrelationships of the Turrid faunas of both countries from Tertiary to Recent times.

Australian Tertiary Molluscan faunas, so far as is known, are incompletely represented. The Eocene has been recognised only recently by Singleton (1943, pp. 267-278), but no gasteropods were recorded. The Oligocene has not provided mollusca, unless by further stratigraphical study it is found desirable to refer here, as uppermost Oligocene, the lower sections of deep borings at present considered basal Janjukian (see Singleton, 1941, pp. 12, 13). I have no material from either the Cheltenhamian (Upper Miocene) or the Werrikooian (Upper Pliocene), but Dennant and Kitson (1903, p. 142) recorded eight Turrids from the latter. Six of these occur in the Australian Recent fauna and two are doubtful records of Miocene species.

This paper covers description of 91 new species, 7 new genera and 3 new subgenera, which brings the Australian Tertiary Turrid fauna to a total of 164 species, more than double the number previously recognised. At least a further twenty new species, belonging to genera already recorded for the Australian Tertiary, are represented in the Finlay collection by solitary examples not good enough for description.

TURRID GENERA OF AUSTRALIA AND NEW ZEALAND*

NEW ZEALAND													TURRIDAE	AUSTRALIA										
E			O			M			P			R	(TURRINAE)	E	O	M				P			R	
													TURRIS					●	·	·	·	·	●	†
													LOPHIOTOMA					●	·	·	·	·	●	†
													XENUROTURRIS					●	·	·	·	·	●	†
													(VERUTURRIS)			●	·	●	·	·	●			
													CLAMTURRIS										●	
													OPTOTURRIS			●	·	●						
·	●	●	·	·	●	●	·	●	●				GEMMULA					●	·	·	·	·	●	†
	●	●	·	·	●								EOTURRIS											
						●	●						ECHINOTURRIS											
						●	●						BATHYTOMA											†
						●	●	●	●	●	●	●	MICANTAPEX			●	●	●	·	●	·	·	●	†
													LUCERAPEX										●	
													EPIDIRONA			?	·	●	·	·	●	●	●	
													EPIDIRELLA							●	·	·	●	
											●	●	FENESTROSYRINX										●	
													(TURRICULINAE)											
						●	●	●	●	●	·	●	COMITAS			●	·	●						
						●							(CARINACOMITAS)			●	·	●						
										●	●	●	PARACOMITAS											
												●	ANTICOMITAS											
	●	·	·	·	●	●	●						INSOLENTIA			●								
													APIOTOMA			●	·	●						†
	●	·	·	·	●	●	●	●	●				ZEMACIES			●								
													(COCHLESPIRINAE)											
													CORONASYRINX			●	·	●						†
		●											TAHUSYRINX											
					●								LIRASYRINX											
					●	·	●						PARASYRINX											
					●	●	●						COSMASYRINX											
													(CONORBIINAE)											
													CONORBIS			?								†
	?												CRYPTOCONUS											†
? ·	·	·	·	·	●	●	●	●	●				AUSTROTOMA			●								
													BELOPHOS			●								

*E — R = Eocene, Oligocene, Miocene, Pliocene and Recent.

New Zealand stages — Eocene (——, Bortonian, Tahuian); Oligocene (Kaiatan, Whaingaroan, Waitakian); Miocene (Hutchinsonian, Awamoan, Urenuian — Tongaporutuan); Pliocene (Opoitian — Waitotaran, Nukumaruan, Castlecliffian).

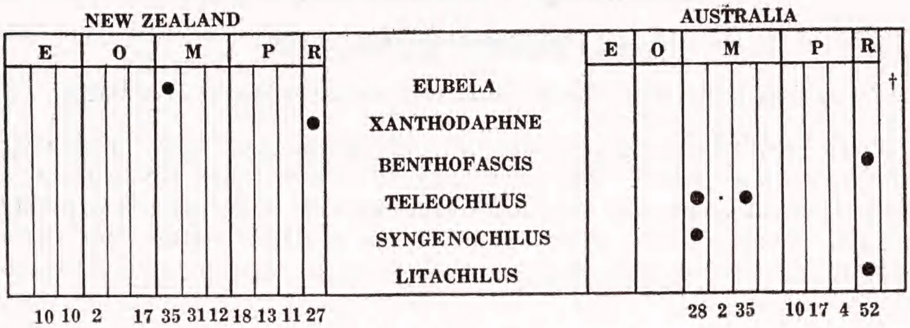
Austrailian stages — Miocene (Janjukian, Batesfordian, Balcombian, Cheltenhamian); Pliocene (Kalimnan, Adelaidean, Werrikooian).

†Indicates genera with a wider distribution than Australia and New Zealand.

	NEW ZEALAND														AUSTRALIA										
	E			O			M			P			R		E	O	M				P			R	
														BELATOMINA			●	·	●						
														LIRATOMINA			●	·	●	·	·	●			
													●	VEXITOMINA										●	
		●	●											NOTOGENOTA											
●	·	●	●	·	·	●	·	●						MARSHALLARIA											
		●	●	●	·	·	·	●	●	●				MARSHALLENA											
														(CLAVINAE)											
			●	·	·	·	●	●						INQUISITOR								●	·	●	†
		?	·	·	·	·	●	●						PSEUDOINQUISITOR					●	·	●	·	·	●	
											●	●	●	ANTIMELATOMA											
														AUSTRODRILLIA										●	
													●	(REGIDRILLIA)											
										●				CLAVATOMA											
			●											TAHUDRILLIA											
						●	●	●	·	●				MAUIDRILLIA			●	·	●	·	●	·	·	●	
							●	●	●	●	●	●		AOTEADRILLIA											
														VIXINQUISITOR				●	●						
														INTEGRADRILLIA					●						
							●	●	·	●	●	●	●	SPLENDRILLIA					●	·	●	●	●	●	
							●							SYNTOMODRILLIA			●	·	●	·	·	●			†
							●	●	·	·	·	·	●	(HAUTURUA)							●				
							●	●	·	●	●	●	●	PHENATOMA											†
											●			MITRELLATOMA											
●	·	·	·	·	·	●	●	●						TOMOPLEURA							●	●	·	●	†
						●	●	●	·	●	●	●	●	MAORITOMELLA			●	·	●	·	·	●	·	●	
							●							MICRODRILLIA					●	·	·	·	·	●	†
									●					TURRIDRUPA										●	†
							●	●						AUSTROCLAVUS					●	·	·	·	·	●	
														IREDALEA										●	†
														(BORSONIINAE)											
		●	·	·	·	●	●							BORSONIA			●								†
			●											CORDIERIA											†
									●					BORSONELLA											†
														CRYPTOBORSONIA			●	·	●						
			●											EOSCOBINELLA											
						●	·	●	·	●	·	·	●	MITRITHARA					●	·	·	·	·	●	
							●	·	·	·	·	·	●	ITIA											
								●						VEXITHARA											
													●	MAORIMORPHA											
									●	●	●			AWATERIA										?	
						●	·	●	●	●	·	·	●	SCRINIUM			●	·	●		·	·	·	●	

NEW ZEALAND | AUSTRALIA

E			O			M			P			R	(MANGELIINAE)	E	O	M				P			R	
													GURALEUS			●	·	●	·	●	●	●	●	
													(PARAGURALEUS)			●	·	●	·	·	●	·	●	
													MARITA										●	
							●	·	●	●	●	●	NEOGURALEUS											
					●	●	●	·	●				(FUSIGURALEUS)											
						●							VEXIGURALEUS											
								●	·	●	·	●	ANTIGURALEUS											
													MAPPINGIA								●			
										●	·	●	LIRACRAEA											
						●	●						ANACITHARA			●	·	·	·	·	·	·	●	†
									●	·	·	●	HETEROCITHARA					●	·	·	·	·	●	
						●							ETREMA			●	·	●	·	●	·	●	●	†
													FILODRILLIA					●	·	·	●	·	●	
						●	●						ETREMOPSIS					●	·	·	●			
													LIENARDIA										●	†
													ACRISTA										●	†
													HEMILIENARDIA										●	†
													PARACLATHURELLA										●	†
													PSEUDORAPHITOMA										●	†
													MACTEOLA										●	†
													EUCITHARA							●	·	·	●	†
													(DAPHNELLINAE)											
											●	●	DAPHNELLA					●	·	·	·	·	●	†
												●	ASPERDAPHNE					●	·	·	·	·	●	
													(ASPERTILLA)								●	·	●	
													FENESTRODAPHNE								●			
												●	VEPRECULA								?	·	●	†
						●							CRYPTODAPHNE											
						●	●						MAORIDAPHNE											
													HEMIDAPHNE										●	†
													EXOMILUS										●	
													PSEUDEXOMILUS								●			
						●	·	·	·	·	·	●	NEPOTILLA										●	
												●	STILLA											
											●	●	ZENEPOS											
													PSEUDODAPHNELLA										●	†
													KERMIA										●	†
													EUCYCLOTOMA										●	†
			●	·	●	●	●						RUGOBELA			●	·	●						
						●	●						PUHA											



The numerical totals of Turrid genera for the successive stages from Eocene to Recent for New Zealand and Australia illustrate several interesting points.

A good basis for comparison between faunas of the two countries exists only in respect to the Hutchinsonian and the Janjukian (Lower Miocene) and the Awamoan and the Balcombian (Middle Miocene).

The Australian material available for study is restricted to the marine horizons of South Australia, Victoria and Tasmania, an area more or less comparable in size and climatic range with that covered by the New Zealand Hutchinsonian and Awamoan. Also the four horizons cited are each represented by richly fossiliferous beds. The available material is thus considered reasonably representative of the respective faunas.

The Australian Janjukian has 28 genera, compared with 35 for the New Zealand Hutchinsonian, 52 for the Australian Recent fauna and 27 for the New Zealand Recent.

In New Zealand the drop from 35 Hutchinsonian to 27 Recent genera probably resulted from a cooling climate coupled with geographic isolation. Warm water genera such as *Gemmula, Inquisitor, Tomopleura, Microdrillia* and *Turridrupa* occurred in the New Zealand Lower Tertiary, but have since died out.

The comparison of 35 Balcombian genera with 52 for the Australian Recent is high when one considers that the Recent faunal figure covers the whole continent, whereas the Balcombian marine fauna is not known from Queensland or Northern Australia.

ACKNOWLEDGEMENTS.

The writer acknowledges the fine effort of Dr. Finlay, not only in forming this important collection, but also in expending upon it a considerable amount of preliminary work. The writer's thanks are due also to Dr. R. S. Allan, who freely handed to the writer series of specimens personally collected and representative of localities additional to those covered by the Finlay material.

Subfamily TURRINAE.

Genus **TURRIS** Bolten, 1798.

Type (s.d. Dall 1909): MUREX BABYLONIUS Gmelin Recent Indo-Pacific.

True *Turris* is elongate-fusiform with attenuated spire and long straight anterior canal. The deep sinus is on a rounded rib just above the peripheral carina and the protoconch is small, of 2½ smooth papillate whorls. Only slightly worn examples are available to me, but there appears to be no brephic stage of axials as in *Lophiotoma* and *Xenuroturris*.

A series of Australian middle Tertiary turrids conforms with this diagnosis of *Turris,* except that the anterior canal is relatively short and slightly twisted. The canal, however, is not suddenly truncated nor is the body-whorl basally angulate as in *Xenuroturris.* There seems to be no serious obstacle to the inclusion of these species in *Turris.*

Recent examples of *Turris* are restricted to the tropical Indo-Pacific. The genotype has been recorded from Cairns, North Queensland (Hedley 1922, p. 214).

Turris septemliratus (Harris (1897).

1897 *Pleurotoma septemlirata* Harris Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 39, Pl. 2, figs. 10a-d.
1896 *Pleurotoma perarata* Tate MS.: Cossmann Ess. Pal. Comp. 2, p. 77.
1898 *Pleurotoma septemlirata: (perarata* as synonym) Tate, Proc. Roy. Soc. N.S.W. 31, p. 392.
1900 *Pleurotoma perarata:* Cossmann & Pissarro, Fauna Eoc. du Contentin 19, p. 24.

Localities: "Muddy Creek, Victoria: Eocene" (type); Muddy Creek, lower beds, Grice's Creek and Altona Shaft (Finlay coll.), Murgheboluc (R. S. Allan) Victoria (Balcombian) Middle Miocene.

Turris selwyni (Pritchard, 1904).

1904 *Pleurotoma selwyni* Pritchard, Proc. Roy. Soc. Vict. 17, p. 326, Pl. 19, fig. 1.

Localities: Muddy Creek, lower beds (type); Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **LOPHIOTOMA** Casey, 1904.

Type (s.d. Woodring 1928): PLEUROTOMA TIGRINA Lamarck, Recent Indo-Pacific.

Shells of the general facies of *Turris,* but with a deep, narrow, "V"-shaped sinus on the flat or slightly concave peripheral carina. The protoconch is small, conical, of about 2½ whorls, followed by a half-whorl of brephic axials.

The (Balcombian) Middle Miocene species here ascribed to *Lophiotoma* agree fairly well except that the protoconch is more papillate of 2¼ whorls, with two or three brephic axials only, at its close. Also the bordering ridges of the concave peripheral carina are weakly crenulated by the narrow flaxuous axials. A resemblance to *Gemmula* results, but that genus has a tall narrow protoconch, the tip smooth, but the rest regularly axially costate. *Lophiotoma* occurs Recent in North Queensland (Hedley, 1922, p. 215, 216).

Lophiotoma murndaliana (Tenison-Woods, 1879).

1879 *Pleurotoma murndaliana* Ten.-Woods, Proc. Linn. Soc. N.S.W. 3, p. 226, Pl. 20, fig. 5.
1896 *Hemipleurotoma murndaliana:* Cossmann Ess. Pal. Comp. 2, p. 79.
1897 *Pleurotoma murndaliana:* Harris Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 38.
1898 *Hemipleurotoma murndaliana:* Tate Proc. Roy. Soc. N.S.W. 31, p. 392.
1914 *Pleurotoma murndaliana:* Chapman Mem. Nat. Mus. Melb. 5, p. 19.

Locality: Muddy Creek, lower beds (type); Altona Bay (Finlay coll.) Victoria (Balcombian) Middle Miocene.

Dennant and Kitson (1903, p. 142) record this species from Limestone Creek, Glenelg River (Werrikooian), but it is probably a mistaken identification.

Lophiotoma murrayana (Pritchard, 1904).

1904 *Pleurotoma murrayana* Pritchard, Proc. Roy. Soc. Victoria 17, p. 335, fig. 10, Pl. 19.

Locality: River Murray Cliffs, near Morgan, South Australia (Balcombian) Middle Miocene.

Closely related to *murndaliana,* but more slender, with stronger peripheral crenulations and weaker subsidiary keels.

Genus **XENUROTURRIS** Iredale, 1929.

Type (o.d.): X. LEGITIMA Iredale, Recent, North Queensland.

True *Turrinae* with tall spire, deep narrowly "V"-shaped sinus which is on the peripheral carina, or about two-thirds whorl height, where there is no clearly defined periphery. The protoconch is bluntly rounded, of two smooth whorls, followed by a half-whorl of brephic axials. The genus is near to *Lophiotoma,* which has a similar protoconch with brephic axials, but is discordant in having a truncated anterior canal and a subangulate base. The genus is of warm water Indo-Pacific distribution.

Iredale's *Clamturris* (1931), introduced for a Recent Australian new species, is based upon an aged specimen minus the protoconch. It strongly resembles *Xenuroturris,* although its author declared that it was of "different texture, being stout and hard."

Xenuroturris tatei (Cossmann, 1896).

1896 *Asthenotoma tatei* Cossmann, Ess. Pal. Comp. p. 173, Pl. 6, fig. 29.
1897 *Pleurotoma trilineata* Harris Cat. Tert Moll., Brit. Mus., Pt. 1, p. 40.
1898 *Asthenotoma tatei:* Tate, Proc. Roy. Soc., N.S.W. 31, p. 398.

Localities: "Australie du Sud," M. Bonnet Coll. = Muddy Creek, lower beds (type of *tatei):* "Hobson's Bay, Victoria" (type of *trilineata)* Balcombe Bay, Mornington; Shelford and Altona Shaft. (Finlay coll.) Victoria (Balcombian) Middle Miocene.

Subgenus **VERUTURRIS**, n. subgen.

Type: V. QUADRICARINATUS n. sp. (Balcombian) Middle Miocene, Victoria.

A compact group of Australian Tertiary turrids, close to *Xenuroturris.* Same style of paucispiral protoconch with brephic axials, sinus "V"-

shaped at about two-thirds whorl height and subangulate base, but discordant in having a moderately long anterior canal. The canal is shorter than in *Turris* and *Lophiotoma,* but very different from the truncated canal of true *Xenuroturris.*

Since these long-canalled Xenuroturrids had a range from at least the (Balcombian) Middle Miocene to the (Adelaidean) Lower Mid. Pliocene, and were represented by five species, subgeneric segregation seems desirable.

Key to Species of Veruturris.

- Shell large (50-55 mm.).
  - Axials absent.
    - Spiral sculpture of dense spiral lineations .... *subconcavus* (Harris)
    - Spiral sculpture of strong cords, 10 on spire whorls ...... *cochleatus* n.sp.
- Shell small (15-26 mm.).
  - Axials absent.
    - Primary spirals 4, middle pair stronger than those at sutures .... *quadricarinatus* n. sp.
    - Primary spirals 3, lower pair stronger, especially peripheral one .... *tomopleuroides* n. sp.
  - Axial folds on upper half of whorls.
    - Primary spirals 2-3, on lower half of spire whorls ...... *bisculptus* n. sp.

Xenuroturris (Veruturris) subconcavus (Harris, 1897).

1897 *Pleurotoma subconcava* Harris Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 41, Pl. 3, figs. 2a-b.

Locality: "Merribee River," Victoria (type) Shelford and Lower Moorabool Valley, Victoria (Dennant and Kitson 1903, p. 96).

Harris' "Meribee River" is evidently a lapsus for Werribee River. It is unlikely, however, that this is the correct locality. If the specimens Dennant and Kitson list are the comparatively smooth shell figured by Harris, then the horizon for the species is probably (Janjukian) Lower Miocene.

Examples from Muddy Creek, lower beds (Balcombian), Middle Miocene, are sculptured with very strong spiral cords and represent a new species which is described below.

Xenuroturris (Veruturris) cochleatus n. sp. Pl. 7, fig. 11.

Shell large, elongated, spire very tall. Protoconch of 2¾ smooth globose whorls plus a quarter whorl of brephic axials, practically the same as in *quadricarinatus,* but a little taller. Spire-whorls sculptured with strong narrowly rounded cords; one linear-spaced pair submargin the suture and a similar pair occur at the periphery, which comes at the apex of the narowly "V"-shaped sinus, and is situated at two-thirds whorl height. Between these pairs of cords is a deep concavity bearing a single weaker cord. Below the periphery there are five strong cords. On the body-whorl there are about 29 cords from the suture to the anterior end. The base is rendered subangulate by the sudden diminution of the strength of spirals after the first below the top of the aperture. Length of anterior canal half that of the entire aperture.

Height, 52 mm.; diameter, 14 mm.

Localities: Muddy Creek, lower beds (type); Altona Shaft (Finlay coll.); Clifton Beach, W. of Princetown (W. J. Parr), Victoria (Balcombian) Middle Miocene.

Xenuroturris (Veruturris) quadricarinatus n. sp. Pl. 1, fig. 5.

Shell small, resembling *X. tatei* except for the longer canal, and four spiral cords on the spire whorls instead of five. Protoconch blunt-tipped of 2½ smooth globose whorls plus a half whorl of brephic axials. Spire-whorls with four evenly spaced strong rounded cords, middle pair stronger than other two, which are at the sutures. There are 1-4 fine spiral threads in the interspaces. A fifth cord emerges from just beneath the top of the aperture. Below this there are about 18 much weaker cords on the base and anterior end. The anterior canal is slightly more than half the height of the complete aperture. Sinus broadly "V"-shaped at its apex on the upper of the two median cords.

Height, 14.5 mm.; diameter, 4.2 mm.

Localities: Muddy Creek, lower beds (type); Altona Shaft (Finlay coll.) (Balcombian) Middle Miocene.

Xenuroturris (Veruturris) tomopleuroides n. sp. Pl. 1, fig. 3.

Shell small, with a prominent peripheral carina at one fourth whorl height, which gives the species a deceptive resemblance to *Tomopleura.* Protoconch broadly rounded, smooth, of 2 whorls, followed by three-fourths of a whorl of brephic axials. Spire-whorls with two spiral threads submargining upper suture, a moderately strong cord at three-fourths whorl height, and the peripheral carina, followed by a third strong spiral at the lower suture. A fourth strong spiral cord emerges from just beneath the top of the aperture. Below this there are about 18 much weaker cords on the base and anterior end. There are occasional interstitial threads on the spire whorls. Sinus broadly "V"-shaped, with its apex on the uppermost of the strong cords. There are weak gemmules on the sinus carina over the early whorls. Aperture and canal as in *quadricarinatus.*

Height, 17.5 mm.; diameter, 5.5 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Xenuroturris (Veruturris) bisculptus n. sp. Pl. 1, fig. 4.

Shell small, slender, with almost straight spire outlines. Sculptured in a curious manner—upper half of whorls with vertical fold-like axials, 17 per whorl, crossed by three spiral cords which are rendered nodulose by the axials—lower half of whorls with 2-3 heavy, closely spaced spirals. Base and anterior end with about 18 spirals, which are rendered rugose by moderately strong axial growth lines. Sinus "V"-shaped, not very deep, its apex on the upper half of the whorls. Length of anterior canal a little less than half total height of aperture. Protoconch broadly rounded, smooth, of two whorls, followed by almost a complete whorl of brephic axials.

Height, 13.9 mm.; diameter, 4.5 mm. (holotype).
Height, 26.7 mm.; diameter, 6.5 mm. (extra large, abnormally coiled).

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Genus **OPTOTURRIS** n. gen.

Type: PLEUROTOMA OPTATA Harris (Balcombian) Middle Miocene, Victoria.

A curious Austral Miocene group with a paucispiral protoconch of 2½ smooth whorls, top bluntly rounded, although the tip is small and asymmetric; last whorl steep sided, lightly convex, with no definite brephic stage; merges into curved axials of adult sculpture. In this last respect the protoconch conforms with that of *Turris,* as opposed to those of *Lophiotoma* and *Xenuroturris.* The sinus is broad, "U"-shaped, not very deep, and extends over almost half the shoulder, with its lower edge situated at the weak peripheral carina. The anterior canal is relatively short and straight. The position of the sinus and general facies of the weakly sculptured type species give a false resemblance to the New Zealand *Parasyrinx.* The second species, *paracantha,* is superficially reminiscent of another New Zealand group, *Cosmasyrinx.*

Key to Species of Optoturris.

Spiral sculpture of dense weak threads.
Periphery rounded to subangulate, with median zone of 4 stronger spirals.
Crenulations on periphery of early whorls only.
4-5 weak spirals below periphery .... *optatus* (Harris)
5-14 weak spirals below periphery .... *editus* n. sp.

Spiral sculpture of moderately strong cords.
Periphery narrowly rounded, bearing double carinae.
Crenulations on periphery of all but last whorl.
3-4 strong spirals below periphery .... *paracanthus* (Ten. Wds.)

Optoturris paracanthus (Tenison-Woods, 1877).

1877 *Pleurotoma paracantha* Ten.-Woods, Proc. Roy. Soc., Tas., for 1876, p. 105.
1898 *Bathytoma paracantha:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.

Localities: Table Cape, Tasmania (type); Torquay, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Optaturris optatus (Harris, 1897).

1897 *Pleurotoma optata* Harris. Cat. Tert. Moll. Brit. Mus., pt. 1, p. 44, Pl. 3, figs. 4a-b.

Localities: "Hobson's Bay, Victoria" (type) = Balcombe Bay; Muddy Creek, lower beds (Finlay coll.) Victoria (Balcombian) Middle Miocene.

Optoturris editus n. sp. Pl. 7, fig. 3.

Related to *optatus,* but much narrower, with taller spire, longer canal, and weaker, more dense spiral threads. The periphery is sub-angulate and below the middle on the early whorls, but both the penultimate and the body-whorl are regularly convex except for a very weak subsutural concavity. On the spire-whorls there are 3-4 slightly stronger spirals submargining the suture and 4 more forming a peripheral zone. There are dense microscopic threads on the shoulder between the subsutural and peripheral spirals, and from 5-14 weak spirals between the peripheral zone and the lower suture. Fine, dense, evenly developed spiral threads cover the base and anterior end. The sinus is broad, but only moderately deep, as described above. Axials are in the form of commashaped crenulations on the periphery of the early whorls, about 13 per whorl. The narrowness is accentuated in the holotype by abnormal loose coiling of the body-whorl.

Height, 25 mm.; diameter, 6.5 mm.

Locality: Grice's Creek, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **GEMMULA** Weinkauff, 1875.

Type (s.d. Cossmann 1896): Pleurotoma gemmata Reeve, Recent, "Gulf of Magdalena, California" may be Indo-Pacific.

A widely distributed genus in warm seas, with a range from Middle Eocene to the present. It is distinguished from true *Turris* by the gemmulate sinus rib and the narowly conic polygyrate protoconch, the tip smooth, remaining whorls axially costate. There are living Australian species, but the genus is not represented in the New Zealand Recent fauna.

Gemmula samueli (Tenison-Woods, 1879).

1879 *Pleurotoma samueli* Ten.-Woods, Proc. Linn. Soc., N.S.W. 3, p. 226, Pl. 20, fig. 3.
1896 *Hemipleurotoma samueli:* Cossmann, Ess. Pal. Comp. 2, p. 79.
1897 *Pleurotoma samueli:* Harris, Cat. Tert. Moll., Brit. Mus., Pt. 1, p. 43.
1898 *Pleurotoma (Hemipleurotoma) samueli:* Tate, Proc. Roy. Soc., N.S.W., 31, p. 392.

Localities: Muddy Creek, lower beds; Altona Shaft (Finlay coll.); Victoria (Balcombian) Middle Miocene.

Resembles the New Zealand (Tahuian) Upper Eocene *waihaoensis* Finlay, 1924.

Gemmula gellibrandensis Chapple, 1934.

1934 *Gemmula gellibrandensis* Chapple, Mem. Nat. Mus., Melb., 8, p. 163, Pl. 19, figs. 3 and 3a.

Locality: Princetown, $\frac{3}{4}$ m. W. of Gellibrand River, Victoria (Balcombian), Middle Miocene.

Genus **MICANTAPEX** Iredale, 1936.

Type (o.d.): Bathytoma agnata Hedley & Petterd, 1906. Recent 250 fath. off Sydney, New South Wales.

Bathytoma-like shells which differ in having a blunt, smooth, paucispiral protoconch. The range in both New Zealand and Australia is Lower Miocene to Recent. Recent species are widely distributed in deep water, occurring in the Indian Ocean, Japan and West Indies. True *Bathytoma* occurs in the New Zealand Tertiary, but it has not been reported from Australia.

Key to Species of Micantapex.

Spiral sculpture of dense beaded lirations.
- 21-27 beaded primary spirals on base.
  - Peripheral fold weak, rounded .... *decompositus* (Tate)
- 15-17 beaded primary spirals on base.
  - Peripheral fold strongly projecting.
    - Shoulder lightly concave .... *fontinalis* (Tate)
    - Shoulder deeply excavated .... *parri* n. sp.

Spiral sculpture of heavy scaly cords.
  Shell elongate-biconic.
    Subsutural fold bearing 2 beaded threads ...... *rhomboidalis* (T. Wds.)
  Shell broadly-biconic
    Subsutural fold very heavy, dominating sculpture ...... *perarmatus* n. sp.
Spiral sculpture. Broad, heavy, nodulose peripheral fold.
  10 nodulose primary spirals on base .... *pritchardi* (Tate)

Micantapex fontinalis (Tate, 1894).

1893 *Dolichotoma fontinalis* Tate & Dennant (nomen nudum), Trans. Roy. Soc., S. Aust. 17, p. 221.
1894 *Genotia fontinalis* Tate, Proc. Roy. Soc. N.S.W. 27, p. 175, Pl. 10, fig. 4.
1896 *Bathytoma fontinalis:* Cossmann, Ess. Pal. Comp. 2, p. 103.
1897 *Bathytoma fontinalis:* Harris, Cat. Tert. Moll., Brit. Mus., Pt. 1, p. 51.
1898 *Genotia fontinalis:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.

Localities: Spring Creek and Torquay, Victoria (Finlay coll.) (Janjukian) (Lower Miocene).

Micantapex perarmatus n. sp. Pl. 7, fig. 1.

This is a broadly-biconic near relative to *rhomboidalis.* Apart from shape it is at once distinguished by the massive development of the subsutural fold, which dominates the sculpture, and the extremely deep canaliculate shoulder. The subsutural fold in *rhomboidalis* bears a pair of beaded threads and is always subsidiary to the peripheral fold.

Height, 35 mm.; diameter, 17.2 mm. (holotype of *perarmatus).*
Height, 35 mm.; diameter, 15 mm. *(rhomboidalis).*

Locality: Clifton Beach, 2 miles west of Princetown, Victoria (collected by W. J. Parr; Laws coll., type) (Balcombian?) Middle Miocene.

Micantapex pritchardi (Tate, 1894).

1894 *Genotia pritchardi* Tate, Proc. Roy. Soc. N.S.W. 27, p. 175, Pl. 10, fig. 9.
1898 *Genotia pritchardi:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.

Locality: Gippsland Lakes, Victoria (Kalimnan) Lower Pliocene. An Australian representative of the New Zealand *murdochi* line.

Micantapex decompositus (Tate, 1894).

1893 *Dolichotoma decomposita* Tate & Dennant (nomen nudum) Trans. Roy. Soc. S. Aust. 17, p. 221.
1894 *Genotia decomposita* Tate, Proc. Roy. Soc. N.S.W. 27, p. 175, Pl. 10, fig. 8 (7c in error on plate).
1896 *Bathytoma gellibrandi* Cossmann, Ess. Pal. Comp. 2, p. 103.
1897 *Bathytoma decomposita:* Harris, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 50.
1898 *Genotia decomposita:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.
1914 *Bathytoma decomposita:* Chapman, Mem. Nat. Mus. Melb. 5, p. 19.

Localities: Torquay (Janjukian) Lower Miocene; Gellibrand River (type); Balcombe Bay and Grice's Creek (Finlay coll.); Clifton Beach, W. of Princetown (W. J. Parr); Murgheboluc (R. S. Allan) Victoria (Balcombian) Middle Miocene.

Torquay and Grice's Creek examples are tall-spired, with straight outlines; Murgheboluc and Clifton Beach shells are wider, with bulging spire outlines. Larger series will be necessary to determine if these forms are constant.

Micantapex rhomboidalis (Tenison-Woods, 1880).

1880 *Pleurotoma rhomboidalis* Ten.-Woods, Proc. Linn. Soc. N.S.W. 4, p. 10, Pl. 2, fig. 9.
1894 *Genotia angustifrons* Tate, Proc. Roy. Soc. N.S.W. 27, p. 175, Pl. 10, fig. 7.
1896 *Bathytoma atractoides* Tate MS. non Watson: Cossmann, Ess. Pal. Comp. 2, p. 103.
1897 *Bathytoma angustifrons:* Harris, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 49.
1898 *Genotia angustifrons:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.
1898 *Genotia angustifrons:* Pritchard, Proc. Roy. Soc. Vict. 11, p. 100.
1914 *Bathytoma rhomboidalis:* Chapman, Mem. Nat. Mus. Melb. 5, p. 19.

Localities: Muddy Creek, lower beds (type); Balcombe Bay and Grice's Creek, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Micantapex parri n. sp. Pl. 7, fig. 2.

Species large, about the size and build of *rhomboidalis,* but more closely related to *decompositus* and *fontinalis.* The sculpture consists of dense beaded lirations. *Decompositus* has the greater number (21-27 on the base), while both *fontinalis* and *parri* have fewer (15-17 on the base). In *parri* there is a heavy, rounded, projecting peripheral fold, and the shoulder is deeply excavated. In *decomposita* the peripheral fold is not very prominent, nor is the shoulder so deeply excavated. In *fontinalis* the periphery is narrowly angulate and the shoulder is broadly and very lightly concave.

In *parri* all the spiral cords are delicately beaded by the crossing of dense fine axial threads. These resolve into definite crenulations on the peripheral fold, 36-40 per whorl. On the spire-whorls there are about 18 spirals. The usual arrangement is 4 cords submargining the suture, 4 cords on the shoulder excavation, 3 cords on carina, 3 weak and very closely spaced threads immediately under the carina, 3 more distant cords below and 1, sometimes 2, weak threads just above lower suture.

Height, 40 mm.; diameter, 17.2 mm.

Locality: Altona Shaft, Victoria (Balcombian) Middle Miocene. (Collected by W. J. Parr; C. R. Laws coll., type.)

Genus **EPIDIRONA** Iredale, 1931.

Type (o.d.): Epidirona hedleyi Iredale, Recent, New South Wales.

A genus of the *Turrinae,* with a superficial resemblance to *Drillia.* Protoconch small, smooth, bluntly rounded, of two whorls, without brephic axials. Sinus shallow to deep, "V"-shaped, situated on the rounded peripheral subangle. Spire tall, but the body-whorl is short, with a truncated, deeply-notched and twisted anterior canal; fasciole ridge-margined. Sculpture of spiral threads or cords with or without arcuate axials on the spire.

Epidirona vardoni (Tate, 1899).

1899 *Surcula vardoni* Tate, Trans. Roy. Soc. S. Aust. 23, p. 108, Pl. 1, figs. 3a-b.

Locality: Murray Desert, Victoria (Janjukian?) Lower Miocene.

I have not seen this species, but according to Dr. Finlay's MS. notes it is "allied to the Abattoirs Bore *Epideira*" (i.e., *adelaidensis).*

Epidirona suppressa (Finlay, 1927).

1904 *Pleurotoma selwyni laevis* Pritchard, Proc. Roy. Soc. Vict. 17, p. 328.
1927 *Epideira selwyni suppressa* Finlay, Trans. N.Z. Inst. 57, p. 516, nom. nov. for *laevis* Pritchard, 1904, non Bell, 1890.

Locality: ?Not definitely stated, but by inference either Muddy Creek, lower beds, or Balcombe Bay, Victoria (Balcombian) Middle Miocene.

Specimens from Abattoirs Bore, 400-500 ft. (Adelaidean) match Pritchard's figure, but actual comparison with the type is desirable.

Epidirona adelaidensis (Ludbrook, 1941).

1941 *Bathytoma adelaidensis* Ludbrook, Trans. Roy. Soc. S. Aust. 65 (1) p. 97, Pl. 5, fig. 17.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

?Epidirona quoyi (Des Moulins, 1842).

Dennant and Kitson's record (1903, p. 142) of *Clavatula monile* Valenciennes from Limestone Creek, Glenelg River (Werrikooian), Upper Pliocene probably refers to the Recent *quoyi,* but I have not seen fossil material.

Genus **EPIDIRELLA** Iredale, 1931.

Type (o.d.): HEMIPLEUROTOMA TASMANICA May, Recent, Tasmania.

The species listed below under this genus is not placed with confidence. It closely resembles *Pleurotoma xanthopaes* Watson in adult facies, having a strong peripheral bulge bearing blunt, strong nodules, a few strong, smooth spiral cords on the base, and a moderately long, slightly flexed, unnotched anterior canal. The protoconch in *sayceana* is small, smooth and globular, of two whorls. That of *xanthophaes* is described by its author as "apex coronated (?) ; it is somewhat rubbed, but seems to consist of 3 to 4 whorls." May described the apex of the related, if not identical, *Hemipleurotoma tasmanica* May, 1911, as "peg-like."

The moderately long unnotched anterior canal of *sayceana* precludes reference to *Epidirona,* which has a truncated, deeply-notched anterior canal. Reference of *sayceana* to *Micantapex* is another possibility, but the style of sculpture, sinus, and trend of the outer lip are more in accord with *Epidirella.* Pending more knowledge of the apical characters of these shells, *sayceana* is provisionally located in *Epidirella,* to which in adult facies it certainly bears considerable resemblance.

?Epidirella sayceana (Chapman, 1912).

1912 *Pleurotoma sayceana* Chapman, Proc. Roy. Soc. Vict. 25 (n.s.) p. 191, Pl. 12, fig. 7.

Localities: Lakes Entrance, Gippsland (type) ; Jemmy's Point, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Subfamily TURRICULINAE.

Genus **COMITAS** Finlay, 1926.

Type (o.d.): SURCULA OAMARUTICA Suter (= DRILLIA FUSIFORMIS Hutton) (Awamoan) Middle Miocene, New Zealand.

This is a group of *Turricula*-like species, best developed in the Middle Tertiary of New Zealand and Australia, but reaching Recent times in a solitary New Zealand species, *Pleurotoma traillii* Hutton 1873.

The genus differs from *Turricula* in having a larger and fewer whorled protoconch, papillate, of two smooth whorls; that of *Turricula* is minute, planorbid, of three whorls. *Comitas* is characterised also by having long axials and only weak submargining of the suture.

Key to Species of Comitas.

Whorls spirally sulcate.
Whorls very slightly angled.
Axials obsolete .... *salebrosa* (Harris)

Whorls spirally ribbed and axially costate.
Spiral primaries 2-3 on spire whorls.
Axials 9 per whorl .... *wynyardensis* (Pritchard)
Spiral primaries 4-5 on spire whorls.
Axials 6-7 per whorl .... *pseudoclarae* n. sp.
Axials 9 per whorl .... *crenularoides* (Pritchard)
Axials 10 per whorl .... *torquayensis* n. sp.

Comitas wynyardensis (Pritchard, 1896).

1896 *Pleurotoma wynyardensis* Pritchard. Proc. Roy. Soc. Vict. 8, p. 109, Pl. 2, figs. 12, 13.
1942 *Comitas wynyardensis:* Powell, Bull. Auck. Inst. Mus. 2, p. 58.

Localities: Table Cape, Tasmania (type); Spring Creek, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Comitas torquayensis n. sp. Pl. 3, fig. 9.

Species very similar in general facies to *wynyardensis*, but with heavier axials and more numerous primary spirals. Axials bluntly rounded, 10 per whorl, extending half way across shoulder, but rapidly fading out on base. Primary spiral cords 4-5 on spire whorls, with a further 3 on body-whorl, at top of aperture. Shoulder with 10 fine spiral threads, two of which are on a narrow subsutural fold. Below the lowest primary spiral on the body-whorl the sculpture is abruptly reduced in strength and consists of about 34 fine linear-spaced threads. The primary spirals are slightly thickened where they cross the axials.

Height, 21 mm.; diameter, 7.8 mm.

Locality: Torquay, lower blue clays, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Comitas crenularoides (Pritchard, 1896).

1896 *Drillia crenularoides* Pritchard, Proc. Roy. Soc. Vic. 8 (n.s.) p. 110, Pl. 3, figs. 6 and 7.

Locality: Table Cape, Tasmania (Janjukian) Lower Miocene.

I have not seen this species, but from the original figure and description it appears to be allied to the foregoing new species. Pritchard's species differs, apparently, in having fewer, more broadly rounded, axial folds and a heavier subsutural fold.

Comitas pseudoclarae n. sp. Pl. 1, fig. 6.

Shell almost inseparable, in its adult facies, from *C. (Carinacomitas) clarae,* but with the typical two-whorled, smooth papillate protoconch of true *Comitas.* The only adult feature that readily separates *pseudoclarae* from *clarae* is the more rapidly contracted base, and resultant longer anterior canal.

Whorls sculptured with numerous narrow spiral cords, and dense weak lirations on the shoulder, as well as distant, low, broadly rounded axials, 6-7 per whorl, which rapidly become obsolete both on the shoulder and on the base. Spire-whorls with 10-12 lirae on the shoulder and 4-5 primary cords, with intermediates, from the peripheral angle to the lower suture. About 40 spirals on body-whorl from angle to anterior end. Spirals relatively strong both near the angle and at the anterior end.

Height, 14 mm.; diameter, 5 mm.

Locality: Torquay, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Comitas salebrosa (Harris, 1897).

1897 *Pleurotoma salebrosa* Harris, Cat. Tert. Moll., Brit. Mus., Pt. 1, p. 42, Pl. 3, figs. 3a-d.

1942 *Comitas salebrosa:* Powell, Bull. Auck. Inst. Mus. 2, p. 58.

Localities: "Hobson's Bay" (type) = Balcombe Bay; Altona Shaft (Finlay coll.) Victoria (Balcombian) Middle Miocene.

Subgenus **CARINACOMITAS** Powell, 1942.

Type (o.d.): PLEUROTOMA CLARAE Ten.-Woods.

This subgenus was provided for Miocene species from both Australia and New Zealand, in which the normal bulbous protoconch of *Comitas* is replaced by a more depressed paucispiral two-whorled protoconch with the second whorl sharply carinate. The New Zealand species is *subcarinapex* Powell 1942 (Hutchinsonian) Lower Miocene.

Comitas (Carinacomitas) aldingensis n. sp. Pl. 1, fig. 7.

Shell much smaller and more heavily sculptured than *clarae.* The protoconch is broadly rounded, rather erect, of two smooth whorls, which are strongly carinated throughout. The species approaches the New Zealand Recent *Anticomitas vivens* Powell 1942, but in that genus the whole protoconch is very depressed and flattened on top. The anterior canal, also is much shorter in the Recent species.

Whorls bluntly angled just below the middle, sculptured with prominent broadly rounded axials, rapidly fading out on shoulder and not extending over base, 10 per whorl. First post-nuclear whorl develops a spiral thread above the carina, soon followed by another below the carina. These spirals form the three primary keels of subsequent whorls. On the body-whorl two further strong spirals develop near the top of the aperture. There are about 26 narrow spirals on the body-whorl, these becoming gradually smaller and closer spaced towards the anterior end. The shoulder is smooth except for a fine line submargining the suture. The three main spirals develop vertically compressed tubercles where they cross the axials.

Height, 6.8 mm.; diameter, 2.9 mm. (holotype).
Height, 7.75 mm.; diameter, 3 mm.

Locality: Aldinga, lower beds, South Australia (Finlay coll.) (Janjukian) Lower Miocene.

Comitas (Carinacomitas) clarae (Tenison-Woods, 1880).

1880 *Pleurotoma clarae* Ten.-Woods, Proc. Linn. Soc. N.S.W. 4, p. 11, Pl. 3, fig. 11.
1896 *Borsonia clarae:* Cossmann, Ess. Pal. Comp. 2, p. 98.
1897 *Pleurotoma clarae:* Harris, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 43.
1906 *Drillia clarae:* Cossmann, Ess. Pal. Comp. 7, p. 224.

Localities: Muddy Creek, lower beds (type); Balcombe Bay; Altona Shaft, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **INSOLENTIA** Finlay, 1926.

Type (o.d.): Pleurotoma pareoraensis Suter (Awamoan) Middle Miocene, New Zealand.

A Tertiary group allied to *Turricula,* but with a very different protoconch, which is polygyrate, narrowly conic, of three to four smooth whorls, followed by a wider whorl with rather distant, arcuate axial riblets. The shells are slender, fusiform, with a moderately deep sinus on the shoulder.

The Australian (Janjukian) Lower Miocene species is the only known occurrence of the genus outside New Zealand.

Insolentia johnstoni (Tenison-Woods, 1877).

1877 *Pleurotoma johnstoni* Tenison-Woods, Proc. Roy. Soc. Tas. for 1876, p. 105.
1942 *Insolentia johnstoni:* Powell, Bull. Auck. Inst. Mus. 2, p. 63.

Localities: Table Cape, Tasmania (type); Torquay, upper beds; Spring Creek, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Victorian examples in Dennant collection are labelled *Pleurotoma* aff. *johnstoni,* but I have no topotypes of *johnstoni* for comparison.

Genus **APIOTOMA** Cossmann, 1889.

Type (o.d.): Pleurotoma pirulata Deshayes, Eocene, Paris Basin.

The Victorian *bassi* with its long, gradually tapered body-whorl and loose coiling, is closely similar to the genotype, which is from the Parisian Eocene. The species *janjukiensis* and its allies present a very different appearance in being closely coiled and of fusiform shape, with a long, narrow anterior canal. These extremes are bridged to some extent by the very slender fusiform *granti* and a related new species. The depth and width of the sinus varies also, being broad and shallow in the *bassi-granti* series, but narrow and deep in *janjukiensis.* The closer coiling and presence of a strong subsutural fold occasions this difference in *janjukiensis.*

The paucispiral protoconch, common to them all, shows insufficient divergence to warrant generic or subgeneric segregation.

Key to Species of Apiotoma.

Protoconch narrowly conical, with a projecting, slightly asymmetric tip.
  Shell slender; loosely coiled whorls. Like *Zemacies.*
    Body-whorl long, very gradually tapered.
      Peripheral nodules 14-15 per whorl .... *bassi* Pritchard
      Peripheral nodules absent .... *pritchardi* n. sp.
  Shell very slender, with attenuated spire. Like *Colus.*
    Body-whorl quickly contracted; long canal.
      Peripheral nodules absent .... *granti* (Pritchard)
      Peripheral nodules on early whorls .... *chapplei* n. sp.

Protoconch globose, asymmetric tip, not projecting.
  Shell rather broadly fusiform; closely coiled whorls.
    Body-whorl quickly contracted; long canal.
      Peripheral nodules absent .... *janjukiensis* (Chapple)
      Peripheral nodules 12-14 per whorl .... *balcombensis* n. sp.

Apiotoma bassi Pritchard, 1904.

1904 *Apiotoma bassi* Pritchard: Proc. Roy. Soc. Vict. 17, p. 328, Pl. 19, fig. 11.
1914 *Apiotoma bassi:* Chapman, Mem. Nat. Mus. Melb. 5, p. 19.

Locality: Cape Otway, near Point Flinders, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Apiotoma janjukiensis (Chapple, 1934).

1934 *Turris janjukiensis* Chapple, Mem. Nat. Mus. Melb. 8, p. 163, Pl. 19, figs. 2, 2a.

Localities: Bird Rock Cliffs, Spring Creek, Torquay, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Apiotoma balcombensis n. sp. Pl. 7, fig. 10.

Species evidently the linear descendant of *janjukiensis,* differing from it chiefly by the presence of regular axials on the broadly rounded peripheral bulge. Also the subsutural fold bears two spiral cords; that of *janjukiensis* has a single thread only, defining its lower edge. Protoconch globose, of 2½ smooth whorls, with small asymmetric tip. Spiral sculpture of 6-7 narrow but sharply raised cords, extending over the peripheral bulge to the lower suture, about 40 on body-whorl from the periphery to the end of the canal. There are 6-7 distinct spiral lirations on the shouder or sinus area. In *janjukiensis* the shoulder spirals increase from 4-8, but are much weaker. Axials broad, fold-like, restricted to the peripheral bulge, 12 per whorl, strongest on later whorls. Sinus rather deep, constricted by the subsutural fold.

Height, 31.3 mm.; diameter, 10.6 mm.

Locality: Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Apiotoma pritchardi n. sp. Pl. 3, fig. 7.

Species close to *bassi,* but without nodules, fewer and stronger, less wavy spiral threads, and a more quickly contracted base. Protoconch globose-conic, smooth, of 2½ whorls, tip small, asymmetric, slightly projecting. Whorls distinctly angled above the middle. Sculpture of rounded, distinct, narrow spiral cords, those on shoulder about half the strength of those below the periphery, 4-7 on shoulder, 5-12 below periphery, and about 48 on the body-whorl from below the periphery to end of anterior canal. Sinus broad, occupying width of shoulder, not very deep.

Height, 20 mm.; diameter, 6 mm.

Locality: Torquay, lower and upper (type) beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Apiotoma granti (Pritchard, 1904).

1904 *Pleurotoma granti* Pritchard, Proc. Roy Soc. Vict. 17, p. 336, Pl. 19, fig. 3.

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Apiotoma chapplei n. sp. Pl. 3, fig. 6.

Species attenuated-fusiform, near to *granti,* but with fewer, more sharply raised spirals, almost smooth shoulder, and blunt peripheral nodules, 11 per whorl on the first three post-nuclear whorls. Protoconch rather narrowly conic, of 2½ smooth whorls, tip slightly asymmetric. Whorls distinctly angled at the middle. Spiral sculpture of sharply raised, rather distant narrow cords, one strong, submargining suture, one weak, just above peripheral angle, two strong, at periphery, and two almost as strong, below. About 36 spirals on body-whorl, widely spaced on upper part of base, weaker and narrowly spaced on anterior canal. The shoulder is smooth except for obscure spiral striations and arcuate growth lines which define the broad, moderately deep sinus.

Height, 18.2 mm.; diameter, 5 mm.

Localities: Balcombe Bay (type); Muddy Creek, lower beds, Murgheboluc (R. S. Allan) Victoria (Finlay coll.) (Balcombian) Middle Miocene.

The Murgheboluc specimen has more closely spaced basal ribbing. Further material may prove it to be separable.

Genus **ZEMACIES** Finlay, 1926.

Type (o.d.): Z. ELATIOR (Finlay (Hutchinsonian) Lower Miocene, New Zealand.

A genus of the *Turriculinae* closely allied to *Apiotoma* Cossmann, 1889, of the Parisian Eocene, but of more slender shape, with drawn out loosely coiled whorls, and a tall, regularly conic protoconch of 4-5 smooth glossy whorls.

A most significant specimen in the Finlay collection from Torquay, Victoria (Janjukian) is superficially similar in adult facies to the Janjukian *Apiotoma bassi* (Pritchard), but has the *Zemacies* protoconch. *Apiotoma* is unknown from the New Zealand fauna, but *Zemacies* has a long range from the (Wangaloan) Upper Cretaceous to the (Opoitian) Lower Pliocene. It would appear probable that *Zemacies* is the older stock and that the divergence of *Apiotoma* from it took place early in the Australian Tertiary.

Zemacies inexpectata n. sp. Pl. 7, fig. 8.

Shell superficially similar to *bassi,* slender, with loosely coiled whorls, but finer spiral sculpture and absence of axials. Regular rest periods give the appearance of flexuous obsolescent axial folds, apparent only on the carina of the later whorls. Whorls distinctly angled just above the middle. Suture faintly but rather broadly submargined. Spire-whorls with 4 to 5 weak, closely spaced threads on the subsutural band, rest of shoulder with microscopic dense striations, and 12-22 weak, closely spaced threads from the periphery to the lower suture. Body-whorl incomplete in sole example. The protoconch is typical, tall, narrowly conic, of 4 smooth whorls, with a tiny apex.

Height (body-whorl incomplete), 24.2 mm. (estimated) 30 mm.; diameter, 10 mm.

Locality: Torquay, lower beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Subfamily COCHLESPIRINAE.

Genus **CORONASYRINX** n. gen.

Type: C. VENUSTA n. sp. (Balcombian) Middle Miocene, Victoria.

This new genus is provided for an Australian Middle Tertiary group which is of similar build to the West Indian *Ancistrosyrinx*, but differs considerably in both the protoconch and in the form of the sinus. In *Ancistrosyrinx* the protoconch is slender, of 1½ smooth, convex whorls, and the sinus occupies only the upper half of the shoulder, which is bisected by a lamellate ridge. Below this ridge there is a second indentation or pseudo-sinus. In *Coronasyrinx* the protoconch is subcylindrical, of two whorls, which are subequal in width, the first with an immersed tip, flattened on top due to strong median angulation of both whorls. The sinus occupies the upper two thirds of the shoulder; its upper arm ascends almost vertically to the suture, but the lower arm is arcuately produced forwards. There is no lamellate ridge on the shoulder. "*Ancistrosyrinx*" *terebralis* (Lamarck) Eocene, France, is remarkably similar to *Coronasyrinx* in adult features, but has a protoconch more like that of *Ancistrosyrinx*.

Coronasyrinx venusta n. sp. Pl. 1, fig. 1.

Slender, fusiform, with tall spire and long, straight, anterior canal. Whorls keeled and coronated medially by strong upcurved tubercles, 18 per whorl. Shoulder with a subsutural band of recurrently oblique oval gemmules, and two similar but much weaker bands immediately above the coronated keel. Between the subsutural and lower gemmulate bands the shoulder is smooth except for weakly defined sinus growth curves. From the keel to the lower suture there are four strong, closely spaced gemmulate spiral bands. On the body-whorl there are 27 gemmulate spirals which extend right to the tip of the anterior canal. One gemmulate cord much stronger than the rest emerges from the lower suture and encircles the base.

Height, 14.8 mm.; diameter, 5.8 mm.

Localities: Torquay, upper beds (Janjukian) Lower Miocene; Balcombe Bay (type) (Finlay coll.) (Balcombian) Middle Miocene, Victoria.

Coronasyrinx semiplana n. sp. Pl. 1, fig. 2.

Shell of similar proportions to *venusta*, but with a more flange-like keel, bearing weaker tubercles, not upcurved, about 20 per whorl. There are no spirals on the spire-whorls, and the basal spirals are plain, not gemmulate. The body-whorl has a strong, sharply raised keel emerging from the suture and encircling the base. There are no spirals above this keel, but 21 plain cords from below it to the end of the anterior canal. Sinus and protoconch as in *venusta.*

Height, 9.6 mm.; diameter, 3.9 mm.

Locality: Aldinga, lower beds, South Australia (Finlay coll.) (Janjukian) Lower Miocene.

Subfamily CONORBIINAE.

Genus **CONORBIS** Swainson, 1840.

Type (monotypy): CONUS DORMITOR Sowerby (Bartonian) Upper Eocene, England.

Conorbis atractoides Tate, 1890.

1890 *Conorbis atractoides* Tate, Trans. Roy. Soc. S. Aust. 13, pt. 2, p. 200.

Locality: "Clayey greensand, Adelaide-Bore, South Australia" (Janjukian?) Lower Miocene.

I have not seen topotypes of this species, but there is an allied new species with fewer spirals from Abattoirs Bore 400-500 feet, Adelaide (Adelaidean) Lower Mid-Pliocene. In the Finlay collection there is a single worn example not good enough for description.

Genus **AUSTROTOMA** Finlay, 1924.

Type (o.d.): BATHYTOMA EXCAVATA Suter (Hutchinsonian) Lower Miocene, New Zealand.

The finding of Australian Lower Miocene representatives of this characteristic New Zealand Tertiary genus is of considerable interest, particularly as there is close resemblance between the Table Cape, Tasmanian, species (Janjukian) and the New Zealand genotype (Hutchinsonian). Both stages are recognised as representing the Lower Miocene in their respective countries.

Austrotoma differs from *Belophos* in details of the protoconch, the presence of a subsutural fold and usually the dominance of the spiral sculpture over the axial. The protoconch is polygyrate of 4-5 whorls, with a minute globular tip, the first three whorls being smooth and the remainder bearing strong, flat-topped, spiral cords crossed by thin axials towards its close. The anterior canal is very short and deeply notched.

Austrotoma inexpectata n. sp. Pl. 7, figs. 6, 7.

Shell ovate-biconic, with short spire, three-fourths height of aperture. Whorls rounded except for a moderately broad, shallowly excavated shoulder. The narrowly rounded shoulder angle is at the middle of the spire-whorls, but above the greatest peripheral convexity of the body-whorl. The surface is sculptured with closely spaced spiral threads and cords crossed on the early spire-whorls by numerous narrowly rounded axial folds. There are no axials on the body-whorl apart from irregular growth lines. There is a narrow subsutural fold. Spire-whorls with 10 fine, spaced threads on the shoulder, 4 to 5 primary cords with intermediates from the shoulder angle to the lower suture and about 32 on the body-whorl from below the shoulder angle. The cords are weak over the upper half of the base, but quite strong below. The axial folds on the early whorls number from 26 to 28. The protoconch is quite typical, as described above. The anterior canal is very short and deeply notched. Fasciole margined by a sharp ridge.

Height, 22.5 mm.; diameter, 11.5 mm. (holotype).
Height, 28.5 mm.; diameter, 13 mm. (paratype).

Locality: Table Cape, Tasmania (Finlay coll.) (Janjukian) Lower Miocene.

Austrotoma janjukiensis n. sp. Pl. 3, fig. 1.

Species similar to *inexpectata*, but without axial folds on the spire. The primary spirals are heavier, more broadly rounded, with a thread in each interspace over most of the base. In *inexpectata* the spirals are obsolescent on the upper half of the base. There is a moderate subsutural fold. Spire-whorls with 8 spaced, spiral threads on the shoulder, 5 strong rounded cords from shoulder angle to lower suture and about 14 primary cords on the body-whorl. Spiral threads, one per interspace over the upper half of the base, increasing to three below, and finally crowding the neck just above the fasciole. The spire is not much less than the height of the aperture.

Height, 26.5 mm.; diameter, 12.1 mm.

Locality: Spring Creek, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Genus **BELOPHOS** Cossmann, 1901.

Type (o.d.): BELA WOODSI Tate (Janjukian) Lower Miocene, Tasmania.

An Austral group of the *Conorbiinae*, nearest allied to *Austrotoma*, but differing from it both in details of the protoconch and in the dominance of the axial sculpture. The protoconch is polygyrate of 4-5 whorls, tip minute, globular and smooth, last two whorls reticulated by thin spirals and stout axials. The anterior canal is very short and deeply notched, while the shoulder is regularly concave without a subsutural fold. So far as is known the genus is monotypic.

Belophos woodsi (Tate, 1888).

1888 *Bela woodsi* Tate, nom. nov. for *Cominella cancellata* Ten.-Woods, Trans. Roy Soc. S. Aust. 10, pp. 147 & 173.
1901 *Belophos woodsi:* Cossmann, Ess. Pal. Comp. 4, p. 163.

Localities: Table Cape, Tasmania (type); Bird Rock Cliffs, Torquay; Spring Creek; Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Genus **BELATOMINA** Powell 1942.

Type (o.d.): BELA PULCHRA *Tate* (Balcombian) Middle Miocene, Victoria.

Moderately large biconic shells with dense axial and spiral sculpture, poorly defined shoulder, very weakly notched anterior canal and a large, very depressed, blunt, smooth-tipped protoconch of 1½ whorls. The genus is known only from the Tertiary of Victoria and Tasmania, (Janjukian) Lower Miocene to (Balcombian) Middle Miocene.

Comparisons between this genus and the related *Liratomina, Belophos* and *Austrotoma* are given in my work on the New Zealand *Turridae* (Powell, 1942, p. 72).

Key to Species of Belatomina.

Subsutural ridge prominent—deeply excavated below.
    Axials broad, fold like—about 27 on penultimate.
        Spiral cords and lirae undulating over axials......*tenuisculpta* (T. Wds.)
Subsutural ridge slight—weakly excavated below.
    Axials narrow and crisp—about 36 on penultimate.
        Spiral cords and lirae undulating over axials............*pulchra* (Tate)
        Spiral cords stronger than axials—regularly clathrate and gemmulate........................*clathrata* n.sp.

Belatomina tenuisculpta (Tenison-Woods, 1877).

1877 *Daphnella tenuisculpta* Ten.-Woods, Proc. Roy. Soc. Tas. for 1876, p. 106.
1898 *Bela tenuisculpta:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 393.

Localities: Table Cape, Tasmania (type); Table Cape, and Torquay, Victoria (Janjukian), Lower Miocene. (Finlay coll.).

Dennant and Kitson (1903, p. 142) record this from Limestone Creek, Glenelg River (Werrikooian) Upper Pliocene; but it is probably a mistaken identification.

Belatomina pulchra (Tate, 1888).

1888 *Bela pulchra* Tate, Trans. Roy. Soc. S. Aust. 10, p. 173.
1897 *Daphnella pulchra* ? Harris, Cat. Tert. Moll. B.M. Pt. 1, p. 62.
1898 *Bela pulchra:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 393 (as syn. of *Daphnella tenuisculpta* Ten. Woods).

Localities: Muddy Creek lower beds (type); Muddy Creek, lower, and Balcombe Bay, Victoria (Balcombian) Middle Miocene. (Finlay coll.).

Belatomina clathrata n. sp. Pl. 7, fig. 9.

1896 *Bela pulchra:* Cossmann Ess. Pal. Comp. 2, p. 90, Pl. 6, figs. 10-11 (not of Tate 1888).

Ovate, aperture half height of shell. Whorls 5, including typical blunt smooth-tipped protoconch of 1½ whorls. Axials narrow, crisp and flexuous, 36 on penultimate, crossed by slightly stronger but equally narow crisp primary cords, seven on penultimate. Points of intersection betwen axials and spirals delicately gemmulate. Three or four axial growth lines and a similar number of spirals delicately cancellate the rectangular interspaces of the primary sculpture. There is a slight depression below the weak subsutural fold. On the body-whorl there are thirteen primary spirals, and the axials extend over the base to the neck. Anterior canal short, broadly open and very weakly notched. There are six closely spaced spiral lirae on the neck. Subsutural sinus broadly and shallowly arcuate.

Height, 17 mm.; diameter, 8 mm. (holotype).

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **LIRATOMINA** Powell, 1942.

Type (o d.): BELA SCULPTILIS Tate, 1888 (Balcombian) Middle Miocene, Victoria.

Moderately large, fusiform-turreted shells with crisp spiral and axial sculpture, the spirals predominant. Protoconch large, smooth and rounded, of 1½ whorls, followed by a half-whorl of closely spaced, fine brephic axials. Post-nuclear whorls are rounded, with a concave shoulder, but no subsutural fold.

There is superficial resemblance to both *Belophos* and *Austrotoma*, but the protoconchs are quite dissimilar. The genus is known only from the Tertiary of Victoria, South Australia, and Tasmania (Janjukian) Lower Miocene, to Adelaidean) Middle Pliocene.

Key to Species of Liratomina.

- Axials obsolete—fine growth lines only.
  - Shoulder prominent.
    - Spiral cords strong, wide-spaced, without intermediates.
      - Penultimate with 6 spiral cords below shoulder .. *crassilirata* (Tate)
    - Spiral cords broad but weak; linear interspaces.
      - Penultimate with about 8 spiral cords below shoulder *adelaidensis* n. sp.
  - Shoulder slight.
    - Spiral cords narrow, crisp, not prominent.
      - Penultimate with about 12 spiral cords below shoulder *sculptilis* (Tate)
- Axials distinct, fold-like, extending from shoulder to lower suture.
  - Shoulder prominent.
    - Spiral cords narrow, crisp, rather prominent.
      - Penultimate with 6-8 spiral cords below shoulder .... *intertexta* n. sp.

Liratomina sculptilis (Tate, 1888).

1888 *Bela sculptilis* Tate, Trans. Roy. Soc. S. Aust. 10, p. 173.
1898 *Bela sculptilis:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 393.
1897 *Daphnella sculptilis:* Harris, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 61.

Locality: Muddy Creek, lower beds (type) (Balcombian) Middle Miocene; Table Cape, Tasmania (Finlay coll.) (Janjukian) Lower Miocene.

A single example from Table Cape compared with a single topotype shows the former to differ slightly from the latter in having a more deeply excavated shoulder and more sharply raised sculpture. Series of both will be necessary to determine if these observations apply constantly.

Liratomina intertexta n. sp. Pl. 7, fig. 4.

Moderately large, fusiform, with turreted spire; whorls 7, including typical, large, smooth, blunt protoconch of 1½ whorls. Aperture about half or a little less than half the height of shell. Axials distinct, fold-like, flexuous, extending from shoulder angle to lower suture, becoming obsolete over base, 21 on penultimate. Shoulder broad, deeply concave. Suture with a weak fold below it. Spiral sculpture consisting of four sharply raised narrow cords with some weaker intermediates on the shoulder or posterior sinus area, and six to eight rather strong, narrow, sharply raised cords with intermediates, extending from the shoulder angle to the lower suture. There are about twenty-four primaries and some intermediates on the body-whorl and base. The fasciole bears about nine spaced, narrow, spiral lirations. The whole surface is crowded with fine crisp axial growth lines. The general appearance of the sculpture resembles that of a woven basket.

Height, 35 mm. (estimated); diameter, 14 mm. (paratype) (Dr. C. R. Laws coll.).

Height, 44 mm. (estimated); diameter, 16.5 mm. (holotype).

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Liratomina crassilirata (Tate, 1888).

1888 *Bela crassilirata* Tate, Trans. Roy Soc. S. Aust. 10, p. 173, Pl. 4, fig. 7.
1896 *Pseudotomo crassilirata:* Cossmann, Ess Pal. Comp. 2, p. 146.
1897 *Daphnella crassilirata:* Tate, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 62.
1898 *Bela crassilirata:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 393.

Localities: Muddy Creek, lower beds (type); Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Liratomina adelaidensis n. sp. Pl. 7, fig. 5.

Moderately large, fusiform, prominently shouldered, with broad but deeply excavated shoulder; whorls 6½, including typical protoconch of 1½ whorls. Aperture half height of shell. Whorls polished, but with distinct slightly raised spiral sculpture. Axials obsolete except for fine growth lines. Shoulder, or posterior sinus area, concave, with seven to nine spiral threads and some intermediates. Seven or eight broad, flattened spiral cords with weakly incised linear grooves between them, extending from the shoulder angle to the lower suture. Spirals subobsolete on the body-whorl, but becoming stronger and wider spaced on the lower part of the base. Fasciole with three strong, medially placed spiral cords, separated from the base by a prominent narrow ridge. Anterior canal deeply notched.

Height, 32.6 mm.; diameter, 16 mm. (holotype).

Locality: Abattoirs Bore, 400-500 feet, Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

The species has a strong superficial resemblance to *Austrotoma.*

Subfamily CLAVINAE.

Genus INQUISITOR Hedley, 1918.

Type (o.d.): PLEUROTOMA STERRHA Watson, Recent, North Queensland.

Inquisitor detritus Ludbrook, 1941.

1941 *Inquisitor detritus* Ludbrook, Trans. Roy. Soc. S. Aust. 65, p. 98, Pl. 5, fig. 18.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

The protoconch is conical, somewhat flattened, of two smooth whorls, but a small tip. It does not fit readily into either *Inquisitor* with its polygyrate, narrowly conical protoconch, or into *Pseudoinquisitor,* which has a bluntly rounded protoconch of 2-2½ smooth whorls.

Genus **PSEUDOINQUISITOR** Powell, 1942.

Type (o.d.): P. PROBLEMATICUS Powell (Awamoan) Middle Miocene,
New Zealand.

A group of *Inquisitor*-like species, but with a smooth, bluntly rounded, paucispiral protoconch of 2½ whorls. The New Zealand range of the genus is Lower and Middle Miocene, but it possibly goes back to the (Bortonian) Middle Eocene. In Australia the genus occurs in the (Balcombian) Middle Miocene, (Kalimnan) Lower Pliocene, and reaches Recent times in *Inquisitor coriorudis* Hedley, 1922, from 300 fath. off Sydney.

Key to Species of Pseudoinquisitor.

Shell small (11-15 mm.), narrow.
Spirals strong, 4-7 on spire whorls.
Axials 7 per whorl, subobsolete on body-whorl ...... *oblongulus* (Harris)
Shell larger (16-21 mm.), broader.
Spirals fine.
5-9 on spire whorls. Axials 10 .... *delicatulus*, n. sp.
Spirals coarse.
3 on spire-whorls. Axials 14-15 .... *trinervis* n. sp.
3-5 on spire-whorls. Axials 13 .... *gippslandensis* n. sp.
6-8 on spire-whorls. Axials 14 .... *scabriculus* n. sp.

Pseudoinquisitor oblongulus (Harris, 1897).

1897 *Drillia oblongula* Harris, Cat. Tert. Moll., Brit. Mus., Pt. 1, p. 56, Pl. 3, f. 7a, b.
1898 *Buchozia oblongula:* Tate, Proc. Roy. Soc. N.S.W. 31, pp. 382, 393.

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Pseudoinquisitor trinervis n. sp. Pl. 3, fig. 3.

Shell robust, strongly axially and spirally sculptured. Axials broadly rounded, vertical, 14-15 per whorl, extending from peripheral angle to half way across base. Spiral cords moderately strong, 3 on spire-whorls, from periphery to lower suture, and 13 on body-whorl and base. Subsutural fold distinct over early spire-whorls, but later becoming obsolete. Shoulder deeply concave. Periphery just above middle.

Height, 19.5 mm.; diameter, 7 mm.

Locality: Jemmy's Point, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Dennant and Kitson's (1903, p. 137) record of the New Zealand "*Drillia wanganuiensis*" from Gippsland Lakes is based no doubt upon one or more of the Kalimnan species here described.

Pseudoinquisitor gippslandensis n. sp. Pl. 3, fig. 5.

Species similar to *trinervis,* but proportionately broader, with slightly telescoped spire-whorls, more spirals, and a stronger, more persistent subsutural fold. Axials broadly rounded, vertical, 13 per whorl, extending over base. Spiral cords strong, 3-5 on spire-whorls, 16 on body-whorl and base. Subsutural fold strong, shoulder deeply concave. Periphery at two-thirds whorl height.

Height, 16 mm.; diameter, 6.25 mm.

Locality: Gippsland Lakes, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Pseudoinquisitor scabriculus n. sp. Pl. 3, fig. 2.

Shell rather large. Axial and spiral sculpture both well developed, subsutural fold weak to obsolescent. Periphery above middle, rounded, shoulder deeply concave. Axials broadly rounded, 14 per whorl, subobsolete over base, crossed by coarse linear-spaced spiral cords, 6-8 on spire-whorls and about 21 on body-whorl and base. The concave shoulder bears indistinct spiral threads.

Height, 21 mm.; diameter, 7.8 mm.

Locality: Gippsland Lakes, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Pseudoinquisitor delicatulus n. sp. Pl. 3, fig. 4.

Differs from all the above species in the numerous delicate spirals and obliquely flexuous, more narrowly crested axials. Periphery just above middle of whorl height; axials planed off on top by broadly excavated shoulder, and rapidly fading out over base. Subsutural fold moderately broad, but not heavy. Spirals linear-spaced, 5-9 per whorl, and about 35 on body-whorl and base.

Height, 17.2 mm.; diameter, 6.5 mm.

Locality: Gippsland Lakes, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Genus **VIXINQUISITOR** Powell, 1942.

Type (o.d.): Drillia vixumbilicata Harris (Balcombian) Middle Miocene, Victoria.

This is another aberrant group of the *Inquisitor* assemblage, characterised by a distinctive protoconch, which is subcylindrical, of 2½ smooth, glossy whorls, the first bulbous, somewhat flattened above, and wider and more convex than the almost straight-sided succeeding whorl. The protoconch passes abruptly into the adult sculpture with just a few faint sinuous growth lines. Apart from a very narrow subsutural margining the adult shell is closely similar in facies to that of both *Inquisitor* and *Pseudoinquisitor*.

The protoconch of *Inquisitor* is smooth, polygyrate, and narrowly conical, and that of *Pseudoinquisitor* smooth, bluntly rounded, paucispiral, of 2½ whorls.

Vixinquisitor vixumbilicatus (Harris, 1897).

1897 *Drillia vixumbilicata* Harris, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 56, Pl. 3, f. 8a, b.

1898 *Drillia vixumbilicata:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 392.

Localities: Muddy Creek, lower beds (type) Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **INTEGRADRILLIA** Powell, 1942.

Type (o.d.): Drillia integra Tenison-Woods (Balcombian) Middle Miocene, Victoria.

In adult facies the genus closely resembles *Pseudoinquisitor,* except that the subsutural fold is obsolete or very weak, and the parietal callus pad slightly constricts the sinus, rendering it subtubular. The protoconch is the chief differentiating character, being bluntly conic, of two smooth whorls, the initial coil lateral, and terminated by a thin, flexuous varix, concave above and produced forwards below. There are several variciform threads just prior to the terminal varix.

Integradrillia integra (Tenison-Woods 1880).

1880 *Drillia integra:* Ten.-Woods, Proc. Linn. Soc. N.S.W. 4, p. 11, Pl. 3, fig. 4.
1878 *Drillia integra:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 392.
1896 *Drillia integra:* Cossmann, Ess. Pal. Comp. 2, p. 84.

Localities: Muddy Creek, lower beds; Balcombe Bay and Altona Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Integradrillia n. sp.

There is a second species of *Integradrillia* at Balcombe Bay, but no adult examples are available for description. Three half-grown examples exhibit a more pronounced peripheral angle, weaker spiral sculpture, especially on the shoulder, and wider-spaced axials.

Genus **MICRODRILLIA** Casey, 1903.

Type (s.d. Cossmann, 1906): PLEUROTOMA COSSMANNI Meyer (= P. MEYERI Aldrich). Upper Eocene, Jackson, Mississippi, U.S. America = ACROBELA Thiele 1925.

The sinus area is deeply sunken between heavy subsutural and peripheral keels, the protoconch is polygyrate, of five whorls, tip smooth, remainder regularly axially costate. The tropical Australian genus *Turridrupa* resembles *Microdrillia*, but has a fewer-whorled protoconch and a single strong spiral cord on the sinus area. *Microdrillia* is of wide Tertiary and Recent distribution (Powell 1942, p. 116).

The Australian Recent *Drillia commentica* Hedley, 1915, *Pleurotomella fastosa* Hedley, 1907, and *Turridrupa pertinax* Hedley, 1922, belong to *Microdrillia*. In New Zealand there is one Tertiary species, *Microdrillia pakaurangia* Powell, 1942 (Hutchinsonian) Lower Miocene, and one *Turridrupa, maoria* Powell, 1942 (Taranakian) Upper Miocene.

Microdrillia steiroides (Chapman, 1928).

1928 *Filodrillia steiroides* Chapman, Rec. Geol, Surv. Vict. 5 (1), p. 121, Pl. 9, fig. 57.

Localities: Balcombe Bay, Mornington (type); Sorrento Bore, 1,340 feet; Muddy Creek, lower beds; Grice's Creek, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **SPLENDRILLIA** Hedley, 1922.

Type (o.d.): DRILLIA WOODSI Beddome, Recent, S.E. Australia.

The genus is tall-spired, with prominent axial sculpture, stopped at an excavated shoulder. Surface smooth or striate. Subsutural fold present, usually strongly developed. Protoconch paucispiral, bluntly-rounded, smooth. Outer-lip with a slight "stromboid"-notch. Parietal callus-pad heavy. Sinus on shoulder, moderate to deep, rounded, sometimes subtubular.

Distribution in both Southern Australia and New Zealand, Lower Miocene to Recent.

Key to Species of Splendrillia.

Shell small (9-11 mm.); slender.
  Spirals incised over all post-nuclear whorls.
  Spirals distinct; shoulder deeply concave.
    Axials broadly rounded, almost vertical, 10 per whorl .. *trevori* (T.-Wds.)
  Spirals weak; shoulder very shallow.
    Axials narrowly rounded, very oblique, 10-11 per whorl .... *formosa* n. sp.
Shell larger (12-16 mm.); moderately broad.
  Spirals confined to neck.
    Axials subobsolete over body-whorl, very oblique, 12 per whorl .... *trucidata* (Ludbrook)
  Spirals strongly incised over all post-nuclear whorls.
    Axials broadly rounded, almost vertical, 12 per whorl .... *adelaidae* n. sp.

Splendrillia trevori (Tenison-Woods, 1879).

1879 *Drillia trevori* Ten.-Woods, Proc. Linn. Soc. N.S.W. 3, p. 227.
1897 *Drillia trevori:* Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 55.

Localities: Muddy Creek, lower beds (type); Altona Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Splendrillia formosa n. sp. Pl. 2, fig. 5.

Shell small, slender, tall-spired, sculptured with narrowly-rounded, very oblique axials, 10-11 per whorl, obsolescent on last whorl. Surface covered with incised spirals, 12 on spire-whorls and about 26 on body-whorl, base, and neck. From the middle of the base to the anterior end the spirals become increasingly deeper and wider-spaced, cutting the surface into quite strong rounded cords. Subsutural fold weak, narrow, and flattened. Shoulder very steep, broad, and very shallow, scarcely indenting the lightly convex whorl outlines. Aperture narrow; parietal callus-pad heavy; posterior sinus deep, subtubular.

Height, 10.5 mm.; diameter, 3.9 mm.

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Splendrillia trucidata (Ludbrook, 1941).

1941 *Austrodrillia trucidata* Ludbrook, Trans. Roy. Soc. S. Aust. 65 (1), p. 98, Pl. 5, fig. 20.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Splendrillia adelaidae n. sp. Pl. 2, fig. 6.

Shell moderately large, proportionately broad, strongly axially and spirally sculptured as in the Recent *harpularia*. Axials vertical, broadly rounded, 12 per whorl, tops sharply planed off at peripheral angle, but extended weakly over base. Surface covered with deeply incised spirals, six on spire-whorls and about 26 on body-whorl, base and neck. Subsutural fold strong, flattened. Shoulder deeply concave. Parietal callus-pad heavy; sinus broadly rounded, moderately deep.

Height, 11.3 mm.; diameter, 4.15 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Splendrillia harpularia (Des Moulins, 1842).

Dennant and Kitson (1903, p. 142) record this Recent South Australian species from Limestone Creek, Glenelg River (Werrikooian) Upper Pliocene.

Genus **SYNTOMODRILLIA** Woodring, 1928.

Type (o.d.): DRILLIA LISSOTROPIS Dall, Recent, West Indies, 73-290 fath.

The genus consists of small-sized species resembling *Splendrillia*, but without a subsutural fold and having the axials continuous from suture to suture. Most Austral members differ from the West Indian series in the subangulate base, but this feature is considered of no taxonomic import.

The Australian range is (Janjukian) Lower Miocene to (Adelaidean) Middle Pliocene.

The only New Zealand member is *S. waiauensis* Powell, 1942 (Hutchinsonian) Lower Miocene, but the subgenus *Hauturua* Powell, 1942, ranges from the Hutchinsonian to Recent, New Zealand.

Key to Species of Syntomodrillia.

- Spiral sculpture confined to neck.
  - Peripheral angle scarcely apparent.
    - Axials 15-16 per whorl .... *ludbrookae* n. sp.
  - Peripheral angle weak.
    - Spirals on neck distinct.
      - Axials 11 per whorl, connected by peripheral thread .. *circinata* n. sp.
      - Axials 8-10 per whorl, no peripheral thread *decemcostata* (Ludbrook)
    - Spirals on neck obsolescent.
      - Axials 12-13 per whorl .... *obsoleta* n. sp.
  - Peripheral angle bluntly rounded.
    - Axials narrowly rounded, 21-24 per whorl .... *venusta* n. sp.
  - Peripheral angle sharply defined.
    - Axials prominent, most numerous on body-whorl; 10-13 per whorl .... *sandleroides* (T.-Wds.)
- Spiral sculpture over all post-nuclear whorls.
  - Peripheral angle above middle.
    - Axials narrow, 17-19 per whorl .... *compta* n. sp.
  - Peripheral angle at four-fifths whorl height.
    - Axials narow, 22-23 per whorl .... *complexa* n. sp.

Syntomodrillia sandleroides (Tenison-Woods, 1877).

1877 *Pleurotoma sandleroides* Ten.-Woods, Proc. Roy. Soc. Tas. for 1876, p. 104.
1898 *Drillia sandleroides* Tate, Proc. Roy. Soc. N.S.W. 31, p. 392.
1919 *Pleurotoma sandleroides:* May, Proc. Roy. Soc. Tas. for 1918, p. 72, Pl. 10, fig. 13.

Locality: Table Cape, Tasmania (type); Torquay, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Syntomodrillia circinata n. sp. Pl. 2, fig. 12.

Species very similar to *obsoleta,* but much larger, axials more erect, and connected across the shoulder-angle by a weak thread; five moderately strong spirals on the neck. Axials 11 per whorl.

Height, 6 mm.; diameter, 2.5 mm.

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Syntomodrillia venusta n. sp. Pl. 2, fig. 7.

Shell glossy, whorls bluntly angled above middle. Sculpture consisting of distinct, narrow, rounded, flexuous axials, 21-24 per whorl, extending from upper suture over base to the neck, which bears six distinct spiral threads. Outer lip terminated by a heavy hollow varix. This labial varix restricts the depth of the posterior sinus, which is abnormally shallow for the genus.

Height, 7.9 mm.; diameter, 3 mm.

Localities: Balcombe Bay, Mornington (type); Altona, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Syntomodrillia complexa n. sp. Pl. 2, fig. 8.

Species related to *compta,* but with a much higher shoulder angle, situated at about four-fifths whorl height. Axials narrowly rounded, extending from upper suture to the upper part of the base, 22-23 per whorl. Spirals low, flattened, weak cords, separated by linear grooves, 10 from shoulder angle to lower suture, none on shoulder and about 27 on body-whorl and base. Outer lip terminated in a rounded hollow varix.

Height, 8.9 mm.; diameter, 3.6 mm.

Locality: Altona Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Syntomodrillia compta n. sp. Pl. 2, fig. 9.

Shell similar to *venusta,* but spirally sculptured over all post-nuclear whorls. Whorls very slightly angled above middle. Shoulder with four or five very indistinct spiral threads; shoulder angle to lower suture with 4-7 distinct rounded spiral cords; body-whorl and base with about 22 moderately strong cords plus a few weak spirals on the neck. Axials narrowly rounded, but strong, 17-19 per whorl, extending from upper suture over the base, but fading out before reaching the neck. Outer lip terminating in a rounded hollow varix.

Height, 9 mm.; diameter, 3.9 mm.

Localities: Balcombe Bay, Mornington (type); Altona (Finlay coll.) Victoria (Balcombian) Middle Miocene.

Differs from *complexa* in having fewer axials and spiral threads overriding the axials, instead of spirals, separated by grooves, between the axials.

Syntomodrillia obsoleta n. sp. Pl. 2, fig. 11.

Much smaller than *sandleroides,* has weaker axials and obsolescent spirals. Shell small, glossy; whorls 5½, including typical smooth, globular protoconch of two whorls. Post-nuclear whorls sculptured with moderately strong, but narrow, obliquely flexuous axials, which extend from the upper suture and fade out about the middle of the base; 12-13 per whorl; 12 on penultimate in holotype. The axials are slightly thickened at the weak peripheral angle, which is just above the middle. There is no spiral sculpture apart from four obsolescent threads on the anterior end.

Height, 5.3 mm.; diameter, 1.9 mm.

Locality: Balcombe Bay, Mornington, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Syntomodrillia decemcostata (Ludbrook, 1941).

1941 *Austrodrillia decemcostata* Ludbrook, Trans. Roy. Soc. S. Aust. 65 (1), p. 98, Pl. 5, fig. 19.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Syntomodrillia ludbrookae n. sp. Pl. 2, fig. 10.

Whorls very lightly convex, peripheral angle scarcely apparent, defined only by a slight thickening of the axials at about the middle. Axials narrow-crested, oblique, flexuous over body-whorl, fading out on middle of base, 15-16 per whorl. Anterior end with 5 distinct spiral threads.

Height, 7 mm.; diameter, 2.7 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Subgenus **HAUTURUA** Powell, 1942.

Type (o.d.): H. VIVENS Powell, Recent, New Zealand.

The subgenus resembles *Syntomodrillia* except for the axials, which are reduced almost to pointed peripheral tubercles. From *Splendrillia* it is distinguished by the smooth shell without spirals, the absence of a subsutural fold, and a more or less subangulate base.

Syntomodrillia (Hauturua) exuta n. sp. Pl. 2, fig. 13.

Shell moderately large, proportionately broad, strongly axially tuberculate, but entirely lacking spiral sculpture, even on the neck. Axials broadly rounded, 13-14 per whorl, stopped at the angulate-periphery, which is situated at the middle of the whorls; becoming obsolete before reaching base. Subsutural fold obsolete. Shoulder broadly and shallowly excavated. Parietal callus-pad very heavy.

Height, 15.6 mm.; diameter, 6 mm.

Locality: Gippsland Lakes, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Genus **MAUIDRILLIA** Powell, 1942.

Type (o.d.): MANGILIA PRAECOPHINODES Suter (Awamoan) Middle Miocene, New Zealand.

A group of small Austro-Neozelanic "Drillias" with a globular protoconch of two smooth whorls. Simple outer lip with a broad, rather shallow, sinus, occupying most of the shoulder. No parietal callus-pad and very shallow, oblique anterior notch. Sculpture axial and spiral. Subsutural cord present or absent.

In Australia the genus ranges from the (Janjukian) Lower Miocene to Recent.

Key to Species of Mauidrillia.

- Spirals numerous, 4-7 on spire-whorls.
  - Shell narrow.
    - Periphery angulate.
      - Axials narrow, very numerous, reticulating surface *consutilis* (T.-Wds.)
      - Axial tubercles on carina of early whorls only ...... *partinoda* n. sp.
      - Axial ribs on spire-whorls only .... *pullulascens* (T.-Wds.)
    - Periphery sharply carinate.
      - Axials thread-like, serrating carina, 25 per whorl .. ..*serrulata* n. sp.
      - Axials broadly rounded, knobs on carina, 11 per whorl .... *torquayensis* n. sp.
  - Shell broad.
    - Periphery broad rounded fold.
      - Axials nodulose on carina .... *intumescens* n. sp.
- Spirals sparse, 3 on spire-whorls.
  - Shell narrow.
    - Periphery angulate.
      - Axials nodulose at spiral intersections .... *trispiralis* n. sp.
      - Axials vertically compressed tubercles on the carina *aldingensis* n. sp.
      - Axials strong on carina only, very oblique.
        - Basal spirals distant linear groove .... *secta* n. sp.

Mauidrillia pullulascens (Tenison-Woods, 1877).

1877 *Pleurotoma pullulascens* Ten.-Woods, Proc. Roy. Soc. Tas. for 1876, p. 104.
1898 *Drillia pullulascens:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 392.
1919 *Pleurotoma pullulascens:* May, Proc. Roy. Soc. Tas. for 1918, p. 72, Pl. 10, fig. 12.

Localities: Table Cape, Tasmania (type); Torquay, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Mauidrillia torquayensis n. sp. Pl. 4, fig. 7.

Species superficially similar to *aldingensis,* but more likely derived from *pullulascens,* from which it differs in being broader, with a stronger, more persistent peripheral angulation and strong axial knobs. Subsutural fold indistinctly defined on early whorls only. Four fine spirals on shoulder. Five to six stronger cords from angle to lower suture on spire-whorls, about 25 on body-whorl, base, and anterior end. Interspaces slightly more than width of spirals. Axials strong at periphery, but becoming obsolete before reaching either suture.

Height, 9.1 mm.; diameter, 3.9 mm.

Locality: Torquay, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Mauidrillia partinoda n. sp Pl. 4, fig. 5.

Species close to *pullulascens,* but with the axials reduced to weak tubercles on the carina of the first two to three post-nuclear whorls only, 11 per whorl. Spiral sculpture consisting of a subsutural margining cord, two weaker cords on the shoulder, the moderately strong peripheral cord at the middle of the whorls, 2 to 3 weaker cords below it, plus 8 on the base and a further 8 linear-spaced threads on the anterior end. The whorls are only slightly angled.

Height, 8.4 mm.; diameter, 3 mm.

Locality: Balcombe Bay, Mornington, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Mauidrillia trispiralis n. sp. Pl. 4, fig. 9.

Shell very slender, sculptured with relatively few strong spirals which are rendered nodulose at the axial intersections. Subsutural fold strong, 2 to 3 threads on shoulder; peripheral carina and two cords below it, all equally strong. About 19 cords on body-whorl from periphery to the anterior end. The holotype exhibits abnormal sculpture on the front of the body-whorl, due to a shell injury and its subsequent repair. Axials 13 per whorl, producing nodulation where they cross the three main spirals. Body-whorl crossed by numerous axial riblets which render the spirals weakly crenulate. The absence of strong axial nodulation on the body-whorl may be due to the shell injury already mentioned.

Height, 9.9 mm.; diameter, 3.5 mm.

Locality: Gellibrand River, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Mauidrillia consutilis (Tenison-Woods, 1880).

1880 *Pleurotoma consutilis* Ten.-Woods, Proc. Linn. Soc. N.S.W. 4, p. 9, Pl. 2, fig. 5.
1896 *Asthenotoma consutilis:* Cossmann, Ess. Pal. Comp. 2, p. 105.
1897 *Pleurotoma consutilis:* Harris, Cat. Tert. Moll. Brit. Mus., pt. 1, p. 41.
1898 *Asthenotoma consutilis:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.
1941 *Filodrillia turrita* Chapple, Mem. Nat. Mus. Vict. 12, p. 121, Pl. 14, fig. 4.

Localities: Muddy Creek, lower beds (type); Balcombe Bay and Altona Bay (Finlay coll.) (Balcombian) Middle Miocene.

Mauidrillia serrulata n. sp. Pl. 4, fig. 8.

Species close to *consutilis,* but with a sharply projecting double carina which is delicately serrated by the crossing of numerous axial threads. Serrations about 25 per whorl. Subsutural fold bearing two spiral threads, three on shoulder, two heavier linear-spaced cords forming the carina, and 2 to 5 beneath it. On the body-whorl, from the carina to the anterior end, there are 19 narrow, flat-topped spiral cords, with interspaces double their width.

Height, 9 mm.; diameter, 4 mm. (holotype).
Height, 12 mm.; diameter, 4.6 mm. (Altona Bay).

Localities: Balcombe Bay (type) and Altona Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Mauidrillia aldingensis n. sp. Pl. 4, fig. 6.

A robust, strongly sculptured species with the axials developed into vertically compressed tubercles where crossed by the carina. Suture bordered below by a narrow, sharp cord, three spiral threads on the shoulder, followed by the peripheral carina and two equally strong cords below it. On the body-whorl the development of intermediates increases the spirals to seven from the carina to the lower suture; there are about 29 spirals from the carina to the anterior end. Axials 13 per whorl, plus numerous fine axial threads which obliquely fenestrate the shoulder spirals.

Height, 9.5 mm.; diameter, 3.8 mm.

Locality: Aldinga, lower beds, South Australia (Finlay coll.) (Janjukian) Lower Miocene.

Mauidrillia secta n. sp. Pl. 4, fig. 10.

Differing from all other species in the deeply incised lines which cut the surface into broad, rounded, spiral folds. Two or three linear grooves below periphery on spire-whorls, nine on body-whorl and base, plus five linear-spaced weaker cords on the anterior end. Subsutural fold moderate. Shoulder without spiral sculpture. Axials very oblique, planed off above, 13 per whorl, strongest at periphery, where they are sharply tubercular, but becoming obsolete before reaching lower suture.

Height, 12 mm.; diameter, 4.5 mm.

Locality: Aldinga, lower beds, South Australia (Finlay coll.) (Janjukian) Lower Miocene.

Mauidrillia intumescens n. sp. Pl. 4, fig. 4.

Shell large for genus; distinguished from all other Australian members by the broad, heavy peripheral fold. A moderately broad subsutural fold, on the early spire-whorls only. Surface of spire crowded with spiral threads, 3 on subsutural fold, 4-8 on broadly concave shoulder, 5-6 on peripheral fold, and 1 or 2 stronger cords below it. Six primary cords on base, plus intermediate threads and 8 closely spaced threads on the anterior end. Axials strongly nodulose on the peripheral fold, 14 per whorl; weakly nodulose on the subsutural fold, but elsewhere they are narrow and weak.

Height, 18 mm.; diameter, 7.5 mm.

Locality: Gippsland Lakes, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Genus **TOMOPLEURA** Casey, 1904.

Type (o.d.): PLEUROTOMA NIVAE Philippi, Recent, Formosa = CRYPTOMELLA Finlay 1924.

In my "New Zealand Recent and Fossil Mollusca of the Family Turridae" (1942, pp. 110-113) I recognized two groups of the spirally keeled "Drillias" in New Zealand: *Tomopleura* with a tall, narrow, polygyrate protoconch of 4-5 whorls, and *Maoritomella* nov. provided for the series, with a paucispiral, broad, dome-shaped or globular protoconch of only two whorls.

Tomopleura has a wide Tertiary and Recent range. In New Zealand it occurs with certainty from the (Duntroonian) Upper Oligocene to the (Awamoan) Middle Miocene, and possibly back to the (Wangaloan) Upper Cretaceous.

The genus is represented in Australia by the (Kalimnan) Lower Pliocene *dilectoides*, the (Adelaidean) Middle Pliocene species described below, and the Recent New South Wales to Queensland species figured by Hedley (1922, Pl. 42, fig. 6) as *Asthenotoma subtilinea* Hedley.

Tomopleura dilectoides (Chapman & Gabriel, 1914).

1914 *Pleurotoma (Drillia) dilectoides* Chapman & Gabriel, Proc. Roy. Soc. Vict. 26 (n.s.), p. 327.

Localities: Gippsland Lakes (Kalimnan) Lower Pliocene (type) (Finlay coll.); Mallee Bore 6, 114-150 ft., and Bore 8, 180-199 ft. (Chapman).

Tomopleura ludbrookae n. sp. Pl. 2, fig. 14.

Shell much more slender than either *dilectoides* or the Recent *subtilinea;* body-whorl broadly arcuate, only slightly angulate, and with more numerous, closer-spaced spirals. Spire-whorls with the main carina just below the middle, two spirals submargin the suture, upper one a weak thread, lower one a strong cord. Two to three threads on the shoulder or sinus area, and two strong cords below the peripheral carina. About 23 spirals on body-whorl, 6 linear-spaced on anterior end. Interspaces on base 2 to 3 times width of cords. All interspaces delicately sculptured with closely-spaced flexuous axial threads. The base is more gradually tapered and the anterior end not so sharply pointed as in *dilectoides.*

Height, 14.9 mm.; diameter, 4.6 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Dennant and Kitson (1903, p. 142) recorded *Pleurotoma violacea* Hinds from Limestone Creek, Glenelg River (Werrikooian) Upper Pliocene. This is possibly either the above new species or the Recent *subtilinea* Hedley, but I have not seen specimens.

Genus **MAORITOMELA** Powell, 1942.

Type (o.d.): PLEUROTOMA ALBULA Hutton, Recent, New Zealand.

Protoconch paucispiral, globular of two smooth whorls, followed by a half whorl of brephic axials.

The New Zealand range is (Duntroonian) Upper Oligocene to Recent. In Australia the genus occurs from the (Janjukian) Lower Miocene to Recent. Recent Australian members are *Drillia dilecta* Hedley, 1903, and *Filodrillia steira* Hedley, 1922.

Key to Species of Maoritomella.

Spire-whorl sculpture.
    Peripheral carina at middle of whorls.
        4 weak spirals above carina, 2 stronger ones below .... *balcombensis* n. sp.

    Peripheral carina at one-fourth whorl height.
        4 weak spirals above carina, 1 heavy one below .... *nutans* n. sp.

    Peripheral angle obsolete, whorls rounded.
        6 evenly developed spiral cords .... *equispiralis* n. sp.

Maoritomella equispiralis n. sp. Pl. 2, fig. 16.

Shell slender, with lightly convex whorls; spire outlines almost straight; no peripheral carina. Spiral cords strong, more or less of equal development, 4 to 5 on early whorls, 6 from penultimate onward. About 25 spirals on body-whorl from suture to anterior end. Axial threads crowd the interspaces and actually cross and cancellate the weaker spirals.

Height, 12.5 mm.; diameter, 4.2 mm.

Locality: Torquay, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Maoritomella balcombensis n. sp. Pl. 4, fig. 12.

Shell slender, sculptured with rounded spiral cords and dense, flexuous interstitial axial growth striae. Whorls lightly convex, very slightly angled by a peripheral carina, situated about or just below the middle. Above the carina there are two closely-spaced narrow cords submargining the suture, and two distant threads on the shoulder. Below the carina there are two cords equal in strength to the peripheral carina. About 16 primary spirals over body-whorl from the carina to the anterior end. Body-whorl rapidly contracted over base, leaving a long, slender, slightly twisted neck and anterior canal.

Height, 11.9 mm.; diameter, 4 mm.
Height, 9.75 mm.; diameter, 3.5 mm. (holotype).

Localities: Balcombe Bay (type); Altona Bay shaft, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

A single half-grown specimen from Gellibrand River has the same arrangement of the spirals, but they are heavier, with narrower interspaces. This may prove to be distinct.

Maoritomella nutans n. sp. Pl. 2, fig. 15.

Shell tall and narrow, with slightly pagodiform spire. Outlines almost straight except for the inconspicuous peripheral carina at one fourth whorl height. Above the carina there are four fine threads grouped in pairs, two submargining suture and two on shoulder or sinus area. Below the carina there is a second spiral cord of the same strength as the carina, and a third just emerges from the suture on the body-whorl. About 26 spirals on body-whorl from suture to anterior end.

Height, 12.2 mm.; diameter, 4.5 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Genus **AUSTROCLAVUS** Powell, 1942.

Type (o.d.): DRILLIA TENUISPIRALIS Marshall, 1918 (Hutchinsonian) Lower Miocene, New Zealand.

A group of *Drillia*-like species easily distinguished by the freely projecting thin outer lip, deeply sinused on the shoulder and insinuated below by a well marked "Stromboid"-notch. Typically, the protoconch is a smooth "Sinusigera," of 4-5 whorls, and the surface of the shell is smooth and glossy. The Australian members, which include two Recent species, *Melatoma lygdina* Hedley 1922, and *Clavus aeneus* Hedley, 1922, as well as three of the four Middle Miocene species described below, have a fewer-whorled protoconch, but it is of similar style to that of the genotype.

Key to Species of Austroclavus.

Shell slender, with moderately long canal.
  Axials strong: on all post-nuclear whorls.
    Whorls with subangulate shoulder .... *lygdinopsis* n. sp.
  Axials subobsolete: on 5 post-nuclear whorls.
    Whorls with angulate shoulder .... *glaber* n. sp.
  Axials subobsolete: on 3-4 post-nuclear whorls.
    Whorls with obsolete shoulder angle .... *teres* n. sp.
Shell wider, with short canal.
  Axials subobsolete: on 1st post-nuclear whorl only.
    Whorls with angulate shoulder .... *brevicaudalis* n. sp.

Austroclavus glaber n. sp. Pl. 2, fig. 1.

Slender, attenuated spired, smooth and polished; whorls weakly angulate above the middle. Protoconch smooth, conical, of 2½ whorls, with a small tip, ending abruptly in a thin "Sinusigera" varix. Post-nuclear sculpture of weak, very oblique, axial folds, 13 per whorl, strongest on the early whorls and obsolete after the fifth whorl. Spiral sculpture restricted to about 24 weak threads on the anterior canal. Outer lip tilted forwards in an arcuate sweep, deeply excavated above by the rounded shoulder sinus and indented below by a pronounced "Stromboid"-notch. There is a strong parietal callus-pad. Canal moderately long, unnotched.

Height, 12.25 mm.; diameter, 4.6 mm.

Localities: Balcombe Bay (type); Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Austroclavus teres n. sp. Pl. 2, fig. 3.

Constantly smaller and more narrowly tapered than *glaber*, with obsolete shoulder angle, the axials restricted to the first three or four post-nuclear whorls, and a narrower aperture.

Height, 10 mm.; diameter, 3.1 mm.

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Austroclavus brevicaudalis n. sp. Pl. 2, fig. 2.

Larger and broader than *glaber*, with well marked shoulder angle throughout. There are obscure axials on the first post-nuclear whorl only, the anterior canal is short and shallowly notched, and there are only four spirals bunched together on the anterior end.

Height, 16 mm.; diameter, 5.8 mm.

Locality: Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

? Austroclavus lygdinopsis n. sp. Pl. 2, fig. 4.

Nearer to the Recent *lygdina* than to the three above described species. Shell slender, with attenuated spire, and moderately long anterior canal. Protoconch smooth, bluntly conic, of 2½ whorls, ending abruptly in a thin flexuous varix. Whorls bluntly angled, below the middle on the early whorls, at the middle on the antepenultimate, and above the middle on later whorls. Sculptured with rather strong, oblique, narrowly rounded axials, obsolete on shoulder area and not quite reaching lower suture, 15 per whorl. The only spiral sculpture consists of closely spaced, fine lirations on the neck and anterior end. Outer lip and sinus as in *glaber*. There is a heavy parietal tubercle which renders the sinus subtubular.

Height, 12 mm.; diameter, 3.9 mm.

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

The species is reminiscent of the Recent *lygdina*, both in shape and in style of sculpture, but the paucispiral, rather bluntly conical protoconch is a considerable deviation from that of the New Zealand genotype. However, the apertural features are so distinctive and constant in the above series that *lygdinopsis*, for want of a better location, may rest here for the present.

? Drillia stiza Tenison-Woods, 1880.

1880 *Drillia stiza* Ten.-Woods, Proc. Linn. Soc. N.S.W. 4, p. 12, Pl. 2, fig. 11.

Locality: Muddy Creek, lower beds (Balcombian).

I have not seen this species, nor can I suggest a satisfactory location for it. The figure is very poor and does not fit the description.

Subfamily BORSONIINAE.

Genus **BORSONIA** Bellardi, 1839.

Type (Monotypy): B. PRIMA Bellardi (Helvetian) Miocene, Turin, Italy.

Turriculid-like shells with two pillar plaits (rarely one). *Borsonia* is widespread in the Tertiary, and there are a few Recent deep-water species. In New Zealand the genus occurs from the (Bortonian) Middle Eocene to the (Hutchinsonian) Lower Miocene.

Key to Species of Borsonia.

Shell elongate fusiform.
    Whorls lightly convex, not angled.
        Axials weak; on early whorls only .... *protensa* Tate
    Whorls angulate.
        Axials obsolescent on body-whorl; 8 on penultimate .... *otwayensis* Tate
            (no specimens available for exact comparison,
            but *polycesta* is described as having more nodu-
            lose axials than *otwayensis*) .... *polycesta* Tate
        Axials persistent over body-whorl; 9 on penultimate .... *tatei* n. sp.

Shell biconic.
    Whorls carinate.
        Suture strongly submargined.
            Axials reaching penultimate .... *balteata* Tate
        Suture weakly submargined.
            Axials on early whorls only .... *torquayensis* n. sp.

Borsonia protensa Tate, 1898.

1898 *Borsonia protensa* Tate, Proc. Roy. Soc. N.S.W. 31, p. 394, Pl. 19, fig. 6.

Locality: Cape Otway, Victoria (Janjukian) Lower Miocene.

Borsonia polycesta Tate, 1898.

1898 *Borsonia polycesta* Tate, Proc. Roy. Soc. N.S.W. 31, p. 395, Pl. 19, fig. 2.

Locality: Cape Otway, Victoria (Janjukian) Lower Miocene.

Borsonia otwayensis Tate, 1898.

1896 *Borsonia otwayensis*, Cossmann, Ess. Pal. Comp. 2, p. 98 (fig. of protoconch only. Specific name not here valid).

1898 *Borsonia otwayensis* Tate, Proc. Roy. Soc. N.S.W. 31, p. 394, Pl. 19, fig. 4.

Locality: Cape Otway, Victoria (Janjukian) Lower Miocene.

Borsonia torquayensis n. sp. Pl. 1, fig. 11.

Shell small, stout, biconic, sharply medially carinated and sculptured with distinct, sharp spiral cords. Only the first two penultimate whorls bear small peripheral tubercles. Shoulder broadly and shallowly concave, smooth except for a few very indistinct spiral threads. Two distinct closely spaced spiral threads submargin the upper suture. Below the carina on the spire-whorls there are strong narrow cords, one on antepenultimate and two to four on the later whorls. Below the carina to the anterior end of the body-whorl there are 24 sharply raised, narrow spiral cords. About the middle of pillar there are two strong plaits. The species approaches *balteata*, from which it is distinguished by the reduced axial sculpture and weaker subsutural margining.

Length, 9.8 mm.; diameter, 4.45 mm.

Locality: Torquay, lower beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Borsonia balteata Tate, 1898.

1898 *Borsonia balteata* Tate, Proc. Roy. Soc. N.S.W. 31, p. 395, Pl. 19, fig. 10.

Locality: Belmont, Victoria (type); Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Borsonia tatei n. sp. Pl. 3, fig. 8.

Species elongate-fusiform, differing from *otwayensis* in being more slender and with more numerous, slightly spinose axials, which persist over all post-nuclear whorls. Whorls angled at the middle. Axials strong, pointed at periphery, rapidly fading out on shoulder and considerably diminished at lower suture. Surface crowded with fine spiral threads and moderately strong cords, roughened by a surface texture resultant from dense axial growth lines. Shoulder with from 4-9 fine spiral threads. Five rather strong flat-topped spiral cords from periphery to lower suture. Interspaces slightly greater than width of cords; each interspace on last whorl develops a fine spiral thread. Spirals on base and neck linear-spaced, numerous, and much weaker than those on spire-whorls. Only one pillar plait showing, at about two-thirds height of aperture.

Height, 21.7 mm.; diameter, 6.75 mm.

Locality: Spring Creek, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Genus **CRYPTOBORSONIA** n. gen.

Type: C. PLEUROTOMELLA n. sp. (Balcombian) Middle Miocene, Victoria.

This is a problematic genus reminiscent in some respects of *Cryptoconus, Pleurotomella, Cordieria* and *Rugobela*, a diverse assemblage representative of at least three subfamilies.

The sinus is almost sutural, as in *Pleurotomella,* or similarly as in the Daphnellid genus *Rugobela*, where the subsutural character of the sinus is masked by a forward trend at the suture. The columella and the protoconch both resemble those of *Cryptoconus,* but the latter is larger and less papillate in *Cryptoborsonia.*

By virtue of a twist-like ridge on the pillar, scarcely a plait, the genus seems to have most in common with the *Borsoniinae.*

Cryptoborsonia rugobela n. sp. Pl. 1, fig. 13.

Small, biconic, with a subsutural fold and concave shoulder. Shoulder angle at two-thirds whorl height. Protoconch damaged, but as in next species. Post-nuclear sculpture of numerous sharply raised, narrow spiral cords 5-8 from shoulder angle to lower suture, 24 on body-whorl; widely spaced on base, weaker and more closely spaced towards shoulder. There are 2-3 weak spiral lirations on the shoulder or sinus area. Axials broadly rounded, strong on spire-whorls, obsolescent on body-whorl, 17 per whorl. Sinus occupying the shoulder, rather deep, arcuate, drawn forwards at the suture and produced forwards below in a broad, arcuate sweep. Outer lip thin. Pillar with a slight median bulge.

Height, 8.5 mm.; diameter, 3.9 mm. (holotype).

Locality: Torquay, lower beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Cryptoborsonia pleurotomella n. sp. Pl. 1, fig. 12.

Small, biconic, whorls weakly shouldered above middle, aperture half height of shell. Protoconch relatively large, papillate, of two smooth, rounded whorls. Post-nuclear sculpture of wide-spaced, weak, narrow, spiral cords, 4 from shoulder angle to lower suture and 18 on the body-whorl. There are three very weak spiral lirations on the shoulder. Weak axials from the shoulder angle to the lower suture on the first 2½ post-nuclear whorls. Sinus occupying the shoulder, rather deep, arcuate, drawn forwards at the suture and produced forwards below in a broad arcuate sweep. Outer lip thin. Pillar with a median twist-like ridge.

Height, 10 mm.; diameter, 4.5 mm. (holotype).

Localities: Balcombe Bay (type); Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **MITRITHARA** Hedley, 1922.

Type (o.d.): COLUMBELLA ALBA Petterd. Recent, Tasmania.

Small biconic, Mitraform Turrids, with two pillar plaits. The New Zealand range is (Waitakian) Upper Oligocene to Recent. In Australia there are the (Balcombian) Middle Miocene species described below, and a number of Recent species.

Key to Species of Mitrithara.

Spiral cords dominant.
  Outer lip lirate within. Shell small (5-6 mm.) ...... *daphnelloides* (T.-Wds.)
  Outer lip smooth within. Shell large (14 mm.) .... *megale* Chapple
Axial ribs dominant.
  Outer lip lirate within. Shell small (6 mm.) .... *fenestrata* n. sp.

Mitrithara daphnelloides (Tenison-Woods, 1880).

1880 *Mitra daphnelloides* Ten.-Woods, Proc. Linn. Soc. N.S.W. 4, p. 7, Pl. 2, fig. 3.
1898 *Mitromorpha daphnelloides:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 397.

Localities: Muddy Creek, lower beds (type); Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Mitrithara fenestrata n. sp. Pl. 1, fig. 14.

Shell small, very similar to *daphnelloides*, but with a reversal of the sculptural plan, the spirals being subsidiary to strongly developed axials. Biconic, height of aperture half that of shell. Spiral sculpture of sharply raised narrow cords, 4 on spire-whorls and 20 on body-whorl, the last 8 closely spaced on the anterior end, elsewhere with interspaces from 2 to 4 times width of cords. On the spire the first cord submargins the suture, after which there is a broad, free space on the shoulder or sinus area. Axials strong, narrowly rounded, 15 per whorl. Aperture with two distinct plaits and six short lirations within the outer lip.

Height, 6 mm.; diameter, 2.5 mm.

Locality: Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Mitrithara megale Chapple, 1941.

1941 *Mitrithara megale* Chapple, Mem. Nat. Mus., Vict. 12, p. 121, Pl. 14, fig. 2.

Localities: Beach Cliffs, 2½ miles west of Gellibrand River, Victoria (Balcombian?) Middle Miocene.

Juvenile examples in the Finlay collection from Grice's Creek probably belong here also.

Genus **SCRINIUM** Hedley, 1922.

Type (o.d.): MITROMORPHA BRAZIERI Smith, Recent, New South Wales.

Small ovate to ovate-biconic shells, with low, dome-shaped, smooth, paucispiral protoconch, wide aperture, very shallow subsutural sinus, very short, widely open, canal and twisted columella.

There are four Recent species in Australia (New South Wales and Southern Australia) and two in New Zealand.

In Australia the genus occurs in the (Janjukian and Balcombian) Lower, Middle Miocene and Recent.

New Zealand occurrences of the genus are (Duntroonian and Waitakian) Upper Oligocene, (Awamoan) Middle Miocene, (Urenuian), Upper Miocene, Waitotaran (Lower Pliocene) and Recent.

Key to Species of Scrinium.

Whorls not shouldered.
  Axials confined to first two post-nuclear whorls.
    Subsutural margining cord obsolete .... *hemiothone* (Ten.-Wds.)

Whorls shouldered.
  Axials persistent, but weaker on body-whorl.
    Subsutural margining cord obsolete.
      Shoulder flattened, not prominent.
        Axials 8 per whorl .... *haroldi* n. sp.

    Subsutural margining cord moderate ,bearing 2 cords.
      Shoulder broad and shallow.
        Axials 8-10 per whorl .... *duplicatum* n. sp.

    Subsutural margining cord strong.
      Shoulder narrowly excavated.
        Axials 10-12 per whorl .... *nanum* n. sp.

Scrinium haroldi n. sp. Pl. 1, fig. 10.

Shell small, ovate-fusiform, aperture less than half shell height. Whorls 6½, including smooth, blunt-tipped, rather narrow protoconch of 2 whorls. Axial sculpture of broad, heavy folds, extending from suture to suture, but not over the base, 8 on the penultimate. Spiral sculpture of regular linear-spaced cords, 14 on the penultimate and about 38 on body-whorl and base. Shoulder flattened, not prominent. No subsutural fold.

Height, 9 mm.; diameter, 3.9 mm. (holoytpe).

Localities: Torquay, upper beds (type) and Spring Creek, upper beds, Victoria (Janjukian) Lower Miocene.

Named as a small tribute to Dr. Finlay, who made the collection upon which this paper is based.

Scrinium duplicatum n. sp. Pl. 1, fig. 8.

Resembles above species, but slightly larger, more robust, with a depressed dome-shaped protoconch, medially angulate whorls, and a moderately strong subsutural fold bearing two linear-spaced spiral cords. Whorls 6, including protoconch. Axials heavy, broadly rounded, not extended over base, 8-10 per whorl (8 on penultimate, in holotype). Spiral sculpture of regular linear-spaced cords, 14 on the penultimate (including two on subsutural fold), and about 38 on body-whorl and base.

Height, 10 mm.; diameter, 4.5 mm. (holotype).

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Scrinium nanum n. sp. Pl. 1, fig. 9.

Similar to *duplicatum,* but smaller; spiral sculpture weaker, subsutural fold much heavier, not duplicated, and axials obsolete or subobsolete on last half-whorl. Whorls 5½, including smooth, dome-shaped protoconch of 1½ whorls. There is a deep, narrow excavation below the subsutural fold. Axials strong, broadly rounded, neither crossing shoulder excavation nor extending to the base, 10-12 on penultimate. Spiral sculpture of closely spaced fine threads, about 16 on penultimate and about 36 on body-whorl and base, those on the base being the stronger.

Height, 6.1 mm.; diameter, 3 mm. (holotype).
Height, 6.9 mm.; diameter, 3.25 mm. (paratype).

Locality: Torquay, upper beds, Victoria (Janjukian) Lower Miocene.

Scrinium hemiothone (Tenison-Woods, 1880).

1880 *Columbella hemiothone* Ten.-Woods, Proc. Linn. Soc. N.S.W. 4, p. 14, Pl. 3, fig. 8.
1896 *Buchozia hemiothone:* Cossmann, Ess. Pal. Comp. 2, p. 92.
1898 *Bela (Buchozia) hemiothone:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 393.
1906 *Buchozia hemiothone:* Cossmann, Ess. Pal. Comp. 7, p. 224.

Locality: Muddy Creek, lower beds, Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Subfamily MANGELIINAE.

Genus **GURALEUS** Hedley, 1918.

Type (o.d.): MANGILIA PICTA Adams & Angas, Recent, New South Wales.

Small, ovate to elongate-fusiform shells with a shallow sinus, occupying the shoulder, and a simple unarmed aperture. Typically the protoconch is polygyrate, dome-shaped and smooth (Group A in key), but an Australian Tertiary series (Group B in key) has the tip of the protoconch minute and exserted, and is followed by a half to a third of a whorl of brephic axials. More careful study of the nuclear characters of the large number of Recent Australian species is desirable before the significance of the presence or absence of this brephic stage can be properly evaluated.

Angas' *Mangilia flavescens* (Hedley 1922, Pl. 52, fig. 144), New South Wales, seems to be a Recent member of "Group B," with incised sculpture as in *subnitidus, volutiformis* and *adelaidensis.* Chapple's *Guraleus cuspidatus* from the Balcombian is a *Daphnella.*

Key to Species of Guraleus.

A. Protoconch polygyrate, dome-shaped, of 3-4 smooth whorls.
    Shell elongate-fusiform. Whorls angled.
        Axials extending from upper suture over base, 10 per whorl.
            Peripheral angle just above middle .... *chapplei* n. sp.
    Shell ovate-fusiform. Whorls rounded.
        Axials extending from upper suture over base, 12 per whorl.
            Spirals numerous, thread-like, 4 weak primaries on spire whorls .... *ludbrookae* n. sp.

B. Protoconch polygyrate, conic, 3-4 smooth whorls, tip minute, exserted, followed by 1/2-1/3 whorl of brephic axials.
    Shell ovate-fusiform to biconic.
        Spiral lirations fine, narrow and numerous.
            Periphery angulate.
                Spirals 7 on penultimate.
                    Axials 11 per whorl .... *singletoni* n. sp.

Periphery rounded.
  Spirals 10 (periphery to lower suture).
    Axials 12 per whorl .... *janjukiensis* n. sp.
  Spirals 5, primary + intermediates.
    Axials 14 per whorl .... *harrisi* n. sp.
Spiral grooves, cutting surface into broad, flat cords.
  Periphery subangulate.
    Spiral cords 4 (periphery to lower suture).
      Axials 10 per whorl .... *subnitidus* Ludbrook
      Axials 6 per whorl .... *volutiformis* Chapman
  Periphery carinate.
    Spiral cords 3 (periphery to lower suture).
    Axials 10 per whorl .... *adelaidensis* n. sp.

GROUP A PROTOCONCH.

Guraleus chapplei n. sp. Pl. 4, fig. 1.

Elongate-fusiform, like the Recent *tasmanicus* (T.-Woods), but narrower. Whorls bluntly angled just above the middle, sculptured with strong rounded axials, 10 per whorl, extending from upper suture completely over base, crossed by distant narrow primary cords and fine interstitial lirations. Spire-whorls with exceedingly fine and numerous lirae on the shoulder, three primary cords from angle to lower suture, and about ten primaries on the body-whorl, six of them distantly spaced, remainder bunched at the neck. The interspaces each have three secondary lirations crossed by much finer dense axial threads. The anterior end is finely lirate. Sinus, aperture and protoconch all typical of the genus.

Height, 12.5 mm.; diameter, 3.9 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Guraleus ludbrookae n. sp. Pl. 4, fig. 3.

Ovate-fusiform, with rounded whorls. Sinus area defined only by a weakening of the axials and the presence of primary spirals below the middle of the whorls. Axials narrowly rounded, 12 per whorl, extending from upper suture completely over base. Sinus area with 5-7 fine threads. Four weak primaries on spire-whorls and about 14 on body-whorl. Interspaces with 1-2 threads. Anterior end with linear-spaced lirations. Sinus, aperture and protoconch all typical.

Height, 7.8 mm.; diameter, 3 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

GROUP B PROTOCONCH.

Guraleus janjukiensis n. sp. Pl. 4, fig. 2.

Ovate-fusiform; whorls strongly convex, not shouldered. Sculptured with heavy rounded axials, 12 per whorl; extending from upper suture completely over base. The sinus area, extending a little more than one third down from the upper suture on the spire-whorls, is delicately sculptured with about 10 very faint threads crossed by equally fine axial hair threads following the shallow concavity of the sinus. Below the sinus area to the lower suture there are 10 narrow crisp threads, and about 30 on the body-whorl. Protoconch polygyrate, conic, of 3½ smooth whorls with minute exserted tip, followed by a half whorl of fine arcuate brephic axials.

Height, 5.75 mm.; diameter, 2.7 mm.

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Guraleus harrisi n. sp. Pl. 6, fig. 15.

Similar to *janjukiensis,* but whorls not so strongly convex, weakly angled above middle and with stronger sculpture, consisting of primary and secondary spirals. Axials strong, rounded, 14 per whorl, extending from upper suture completely over base. Spiral sculpture consisting of 8 fine lirations on the shoulder or sinus area, 5 primary spirals with a thread in each interspace from shoulder angle to lower suture, and about 26 primary spirals on body-whorl, the interstitial threads not continuing below the upper third of the base. Protoconch polygyrate, conic, of 3 smooth whorls, with minute exserted tip, followed by a half whorl of straight vertical brephic axial threads.

Height, 7.75 mm.; diameter, 3 mm.

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Guraleus singletoni n. sp. Pl. 6, fig. 14.

Fusiform, with tall turreted spire. Whorls sharply angled at about two-thirds whorl height. Axials narrow, 11 per whorl, weak over shoulder, vertical on spire-whorls but arcuate and irregular over body-whorl; extending from upper suture completely over base. Spiral sculpture consisting of 4 or 5 weak threads on the shoulder and 7 weak, slightly irregular cords from the shoulder angle to lower suture. On the body-whorl the spiral cords are numerous, linear-spaced but weak, the most distinct being 12 on the anterior end. Protoconch polygyrate, conic, of 3 smooth whorls, followed by a half whorl of fine brephic axials.

Height, 6.5 mm.; diameter, 2.5 mm.

Locality: Forsyth's Grange Burn, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Guraleus volutiformis Chapman & Crespin, 1928.

1928 *Guraleus volutiformis* Chapman & Crespin, Rec. Geol. Surv. Vict. 5, Pt. 1, p. 123, Pl. 9, fig. 62.

Localities: Sorrento Bore, 1050 ft. (type); Muddy Creek, lower beds, Victoria (Chapman) (Balcombian) Middle Miocene.

Guraleus subnitidus Ludbrook, 1941.

1941 *Guraleus subnitidus* Ludbrook, Trans. Roy. Soc. S. Aust. 65, 1, p. 99, Pl. 5, fig. 22.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Guraleus adelaidensis n. sp. Pl. 6, fig. 13.

Related to *subnitidus,* having same style of incised spirals, but the shell is smaller, more solid, with a carinate periphery and only three cords on the spire-whorls, and about 19 on the base. There are 5 distinct lirations on the shoulder or sinus area. The uppermost of the three cords on the spire-whorls forms the sharp median peripheral carina. Protoconch polygyrate, conic, of 3½ smooth whorls with minute exserted tip, followed by a half whorl of rather strong vertical brephic axials.

Height, 4.8 mm.; diameter, 2.1 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Guraleus tasmanicus (Tenison-Woods, 1876).

Guraleus australis (Adams & Angas, 1864).

Dennant and Kitson (1903, p. 142) recorded both these Recent species (as *Mangilia jacksonensis* Angas and *Bela australis* Adams & Angas) from Limestone Creek, Glenelg River (Werrikooian) Upper Pliocene, but I have not seen fossil material.

Subgenus **PARAGURALEUS,** n. subgen.

Type: P. BALCOMBENSIS n. sp. (Balcombian) Middle Miocene.

This is a compact group of Lower Miocene to Recent Australian Turrids, identical with *Guraleus* in adult facies, but with a very different protoconch, which is paucispiral of two globose whorls, assymmetrically wound, with a small tip and terminated by several closely spaced, thin, sinuous brephic axials.

The essential characters of the group, paucispiral protoconch combined with *Guraleus* shape, approximate to those of a New Zealand Upper Miocene to Recent genus, *Antiguraleus* Powell 1942. Nevertheless, it is very doubtful if there is real relationship. It is much more likely that both groups arose by mutation in their respective countries—*Antiguraleus* from *Neoguraleus* and *Paraguraleus* from *Guraleus.*

Paraguraleus has a more definite sinus than *Antiguraleus,* the anterior end is not marked off in sculpture and the protoconch is more distinctly of two globose whorls. That of *Antiguraleus* is asymmetric, the tip adpressed, not well marked, but thence suddenly and rapidly becoming inflated, bulging more on one side. The Recent *Guraleus costatus* Hedley, 1922, 80 fathoms, New South Wales, is probably a *Paraguraleus.* This species was included in *Marita* Hedley, 1922, but the type of that genus, *Cythara compta* Adams and Angas, 1864, New South Wales to Western Australia, is not congeneric with any of the foregoing species. It is ovate, short-spired and of Cytharid *(Eucithara)* shape and sculpture, but without the apertural processes. The protoconch in *compta* is minute, smooth, polygyrate conic, of three whorls.

Key to Species of Paraguraleus.

Shell elongate-fusiform.
  Spirals; incised grooves cutting surface into flat cords.
    Axials 13 per whorl .... *incisus* n. sp.
Shell ovate-fusiform.
  Spirals; regular closely spaced fine threads.
    Axials 12 per whorl .... *finlayi* n. sp.
    Axials 12-14 per whorl .... *abbreviatus* n. sp.
  Spirals; narrow primary cords with intermediate threads.
    Axials 16 per whorl .... *balcombensis* n. sp.

Guraleus (Paraguraleus) finlayi n. sp., Pl. 5, fig. 12.

Ovate-fusiform. Whorls convex, bluntly angled at two-thirds whorl height. Sculptured with heavy rounded axials, 12 per whorl, extending from upper suture over base to neck. These are crossed by fine, closely spaced, spiral threads, much weaker on shoulder, 18 from suture to suture on penultimate and about 48 on the body-whorl. Outer lip thin edged, strengthened behind by an axial. Sinus rounded, distinct, occupying shoulder.

Height, 6.95 mm.; diameter, 3 mm.

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Guraleus (Paraguraleus) balcombensis n. sp. Pl. 5, fig. 13.

Ovate-fusiform. Whorls strongly convex, weakly shouldered above the middle. Sculptured with rounded, closely spaced, flexuous axials, 16 per whorl, extending from upper suture over base to the neck; crossed by narrow spiral cords and fine interstitial lirations. Spire-whorls with about 12 lirations on the shoulder, 4 primary cords on the penultimate, and three lirations in each interspace, the middle one of the three slightly stronger. There are about 12 primary cords on the body-whorl and many intermediates. Aperture as in *finlayi.*

Height, 8.5 mm.; diameter, 3.4 mm.

Locality: Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

There is a Batesfordian ancestor to this species with smaller protoconch and more numerous spirals (R. S. Allan coll.). I have insufficient material to warrant naming it.

Guraleus (Paraguraleus) abbreviatus n. sp. Pl. 5, fig. 11.

Ovate-fusiform. Whorls convex, not shouldered. Sculptured with heavy, rounded axials, 12-14 per whorl, extending from upper suture to lower part of base, crossed by fine, regular, closely spaced spiral threads, 14-15 from suture to suture on the penultimate, and about 40 on the body-whorl. The outer lip is thin edged and slightly incurved, strengthened behind by an axial. Sinus rounded, shallow.

Height, 5.9 mm.; diameter, 2.5 mm. (holotype).

Height, 7.3 mm.; diameter, 3.25 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Guraleus (Paraguraleus) incisus n. sp. Pl. 5, fig. 14.

Elongate-fusiform. Whorls lightly convex, very slightly shouldered at three-fourths whorl height. Sculptured with strong, rounded, flexuous axials, 13 per whorl, extending from upper suture over base to neck; crossed by incised spiral grooves, 16 from suture to suture on the penultimate and about 42 on the body-whorl. Outer lip thin edged and slightly incurved, strengthened behind by a rounded varix. Sinus rounded, distinct, occupying shoulder.

Height, 9.8 mm.; diameter, 3.5 mm. (holotype).
Height, 15.9 mm.; diameter, 5.2 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

?Guraleus (Paraguraleus) obsoletus (Harris, 1897).

1897 *Mangilia obsoleta* Harris, Cat. Tert. Moll. Brit. Mus., p. 57, Pl. 3, figs 9a-b.

Locality: Muddy Creek, Victoria (Balcombian) Middle Miocene.

This species is not included in the key. It is known to me only from the original description and figure, which suggest location in *Paraguraleus.*

Genus **MAPPINGIA** Ludbrook, 1941.

Type (o.d.): M. ACUTISPIRA Ludbrook, South Australia, Lower Mid-Pliocene.

Mappingia acutispira Ludbrook, 1941.

1941 *Mappingia acutispira* Ludbrook, Trans. Roy. Soc. S. Aust. 65, 1, p. 99, Pl. 5, fig. 21.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Adelaidean) Lower Mid-Pliocene.

I have not seen this species. From the description it is like a small *Guraleus,* but with a thickened, conspicuously dentate outer lip. The protoconch is polygyrate, of three smooth whorls.

Genus **ETREMA** Hedley, 1918.

Type (o.d.): MANGILIA (GLYPHOSTOMA) ALICIAE Melvill & Standen, Recent, Loyalty Islands.

Fusiform shells with a small protoconch of 2-3 globular whorls, the last one to two angulate. Adult sculpture of axials and spirals. Aperture with a heavy labial varix, deep rounded to subtubular sinus, occupying the shoulder, and a short anterior canal. There is a heavy parietal tubercle, and usually other denticles and ridges on the pillar, as well as lirations inside the outer lip.

A related New Zealand Miocene genus, *Etremopsis,* has a large polygyrate protoconch of 5-6 carinated whorls, last half-whorl axially costate.

Key to Species of Etrema.

Shell narrowly fusiform; turreted; peripheral angle sharp.
Shell small (4-10 mm.).
*Spirals on penultimate 1-2.
Axials 7 per whorl .... *praespurca* Chapman & Crespin
Spirals on penultimate 2-3.
Axials 10 per whorl .... *turrita* Chapple
Spirals on penultimate 3.
Axials 11 per whorl .... *pseudoelegans* Chapman & Crespin
Spirals on penultimate 3-4.
Interstitial lirations granular.
Axials 13 per whorl .... *granolirata* n. sp.
Interstitial lirations absent.
Axials 16 per whorl .... *janjukiensis* n. sp.
Shell narrowly fusiform. Shoulder angle weak at 2/3 whorl height.
Spirals on penultimate 4.
Axials 18 per whorl .... *morningtonensis* Chapple

Shell broadly fusiform; whorls inflated; shoulder angle distinct.
Shell small (8-14 mm.).
Spirals on penultimate 4.
Axials 10-19 per whorl (covers 4 forms) ...... *bidens* (Ten.-Woods)
Spirals on penultimate 5.
Axials 12 per whorl .... *exsculpta* n. sp.
Spirals on penultimate 5-8.
Axials 22-25 per whorl .... *obdita* (Harris)
Shell large (17-20 mm.).
Spirals on penultimate 4.
Axials 15 per whorl.
Shoulder gently descending, spirals obsolete
gippslandensis n. sp.
Spirals on penultimate 8.
Axials completely absent.
Shoulder concave, sloping inwards, spirally lirate
mirabilis n. sp.
*Refers to primary spirals, throughout key.

Etrema janjukiensis n. sp. Pl. 5, fig. 1.

Similar to *granolirata* in shape and primary sculpture, but without the secondary granular lirations. Also the sinus is deeper and there is a strong parietal tubercle. Protoconch as in *granolirata*. Spire-whorls with 4-5 lirations on the shoulder, 4 narrow spiral cords from peripheral angle to lower suture, the peripheral cord being no stronger than the others. Body-whorl with about 22 spirals, the last 12 linear-spaced on the anterior end. No interstitial threads (excepting 1 below the carina on body-whorl in the holotype only). Axials narrowly rounded, extending from upper suture over the base to the neck, 16 per whorl, weaker on shoulder.

Height, 5.7 mm.; diameter, 2.4 mm.

Localities: Table Cape, Tasmania (type); Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Etrema granolirata n. sp. Pl. 5, fig. 3.

Small, narrowly fusiform, with medial, sharply angulate periphery. Sculptured with strong, narrowly rounded axials, narrow, sharply raised spirals, the latter undulating over the axials, and dense interstitial granular lirations. Protoconch small, globular, of two smooth whorls, the second subangulate. Spire-whorls with 7 lirations on the shoulder, 3-4 spiral cords from peripheral angle to lower suture, the peripheral cord being much the strongest. Body-whorl with about 19 primary cords. Granular lirations 2-4 per interspace. Axials strong, undiminished over shoulder and extending half way across base, 13 per whorl. Labial varix heavily rounded. Sinus broad and shallow. Very slight parietal callus pad. No apertural lirations.

Height, 6.2 mm.; diameter, 2.75 mm.

Locality: Balcombe Bay, Mornington, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Etrema praespurca Chapman & Crespin, 1928.

1928 *Etrema praespurca* Chapman & Crespin, Rec. Geol. Surv. Vict. 5, Pt. 1, p. 122, Pl. 9, fig. 60.

Locality: Sorrento bore, 1050-1107 feet, Victoria (Balcombian) Middle Miocene.

Etrema turrita Chapple, 1941.

1941 *Etrema turrita* Chapple, Mem. Nat. Mus., Melb. 12, p. 120, Pl. 14, fig. 3.

Locality: Altona, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Etrema pseudoelegans Chapman & Crespin, 1928.

1928 *Etrema pseudoelegans* Chapman & Crespin, Rec. Geol. Surv. Vict. 5, Pt. 1. p. 123, Pl. 9, fig. 61.

Locality: Sorrento bore, 1158 feet, Victoria (Balcombian) Middle Miocene.

Etrema bidens (Tenison-Woods, 1879).

1879 *Mangelia bidens,* Ten.-Woods, Proc. Linn. Soc. N.S.W. 3, p. 227, Pl. 20, fig. 2.
1896 *Mangilia bidentata* (sic *bidens* Tate): Cossmann, Ess. Pal. Comp. 2, p. 123.
1897 *Clathurella bidens:* Harris, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 59.
1898 *Clathurella bidens:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.
1922 *Heterocithara bidens:* Hedley, Rec. Aust. Mus. 13, p. 297.

Locality: Muddy Creek, lower beds, Victoria (type) (Balcombian) Middle Miocene.

In the Finlay collection there are four closely allied species grouped around *bidens,* but without recourse to the type I am unable at present to evaluate them. No. 1 from Muddy Creek, lower beds, has very convex whorls with obsolete shoulder angle, and axials 16 per whorl, strong from suture to suture. Height 10.5 mm. No. 2, also from Muddy Creek, is broad and squat, with angulate shoulder and 17-19 axials per whorl. Height 8 mm. In size and general features it fits Ten.-Woods description, but not his tall-spired figure. No. 3, from Balcombe Bay, is proportioned like Ten.-Woods' figure, has an angulate shoulder and 10-14 axials per whorl. Height 13.5 mm. The latter form evidently represents Harris' (1897, p. 59) interpretation of *bidens.* No. 4, from Balcombe Bay, is similar in proportions to No. 3, but narrower, more elate, with more numerous spiral cords. The shoulder is more steeply descending, with axials undiminished, and crossed by moderately strong spirals. Axials 13 per whorl. Height 8 mm.

Etrema exsculpta n. sp. Pl. 5, fig. 4.

Similar to *bidens,* but with more elate spire and very definite, sharply raised sculpture. Strong, narrowly raised axials extend from upper suture over base to neck, 12 per whorl, crossed by narrow, sharply raised spirals, 5 per whorl below shoulder on spire and about 17 on body-whorl. The shoulder bears 5 narrow but very distinct spiral threads. Sinus deep. Parietal tubercle strong. Outer lip thin-edged, strengthened behind by a heavy varix, and lirate within. Spire almost twice height of aperture.

Height, 8.5 mm.; diameter, 3.8 mm.

Locality: Altona Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Etrema obdita (Harris, 1897).

1897 *Clathurella obdita* Harris, Cat. Tert. Moll. Brit. Mus., Pt. 1, p. 59, Pl. 3, figs. 11a-b.
1898 *Clathurella obdita:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 398.
1922 *Heterocithara obdita:* Hedley, Rec. Aust. Mus. 13, p. 297.

Localities: Batesford Quarry (R. S. Allan) (Batesfordian); Muddy Creek, lower beds (type); Balcombe Bay, Mornington, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Etrema morningtonensis Chapple, 1934.

1934 *Etrema morningtonensis* Chapple, Mem. Nat. Mus. Melb. 8, p. 164, Pl. 19, figs. 4a, b.

Locality: Balcombe Bay, Mornington, Victoria (Balcombian) Middle Miocene.

Etrema gippslandensis n. sp. Pl. 5, fig. 2.

Resembles *bidens,* but much larger; differing in the protoconch, having a less angulate second whorl, obsolete shoulder spirals, and absence of granules on the basal spirals. Whorls angled at two-thirds whorl height. Shoulder almost flat, gently descending. Primary spirals 4 on spire-whorls, 15 on body-whorl, with 1-3 weak secondary lirae in interspaces. Axials broadly rounded folds, 15 per whorl, fading out on shoulder and base. Sinus deep. Parietal tubercle strong, a few irregular minute tubercles on lower half of pillar. Inner lip thin at edge, strengthened behind by a heavy varix; very faint lirations within.

Height, 20.5 mm.; diameter, 9.75 mm.

Locality: Gippsland Lakes, Victoria (Finlay coll.) (Kalimnan) Lower Pliocene.

Etrema mirabilis n. sp. Pl. 5, fig. 5.

Large, differing from all other species of *Etrema* in the total absence of axials, concave, inwardly inclined shoulder and erect, papillate, smooth protoconch of 2¼ whorls without a keel. Spiral sculpture of broad, flattened cords separated by narrow, shallow interspaces, 8 on penultimate, 23 on body-whorl. A thread in each interspace over the median area of body-whorl. Sinus deep, subtubular. Parietal tubercle strong. Outer lip thin and crenulated at edge, strengthened behind by a heavy varix, and within by a narrow ridge.

Height, 17.5 mm.; diameter, 7.6 mm. (holotype).

Locality: Curdie's River, near Peterborough, Victoria (Kalimnan, fide Finlay) Lower Pliocene (Finlay coll.).

The protoconch of *gippslandensis* is similar except that it does show a slight angulation on the last whorl.

Etrema bicolor (Angas, 1871).

Dennant and Kitson (1903, p. 142) recorded this Recent species (as *Clathurella bicolor)* from Limestone Creek, Glenelg River (Werrikooian) Upper Pliocene, but I have not seen fossil material.

(Etrema trophonalis Chapman and Crespin, 1928) Rec. Geol. Surv. Victoria 5, pt. 1, p. 122, Pl. 9, fig. 59, Sorrento Bore, 990 feet, Victoria (Balcombian) is not a Turrid (see under *Pseudexomilus).* It is a Pyrenid of the same group as *Aesopus semicostatus* Tenison-Woods 1880, and *Mangilia spica* Hedley 1907. The elongate-conic, smooth protoconch of 2½-3 whorls tapered to a fine point is common to all three species. Also the Recent *spica* has a cinnamon-tinted apex, another feature common in the *Pyrenidae.* These shells may be located in *Retizafra.*

Genus **ETREMOPSIS** Powell, 1942.

Type (o.d.): DRILLIA IMPERFECTA Suter (Awamoan) Middle Miocene, N.Z.

A group of Miocene species hitherto considered restricted to New Zealand. The genus is similar to *Etrema* in adult facies, except that apart from a parietal tubercle denticles and plications are constantly absent from the pillar. The protoconch is quite distinct from the small paucispiral apex of *Etrema,* being large, polygyrate, of 5 or 6 whorls, the tip minute and globular, but all remaining whorls sharply carinated. The last half-whorl has regular axials, otherwise the protoconch is smooth and glossy.

Etremopsis opposita n. sp. Pl. 5, fig. 7.

Small, fusiform, with tall turreted spire. Whorls convex, but with a straight sloping shoulder at two-thirds whorl height, which forms a slight angle above the greatest peripheral convexity. Sculptured with strong, rounded, vertical axials, 11 per whorl, extending from upper suture over base to neck; crossed by primary cords and secondary lirations. On the penultimate there are 5 lirations on the shoulder, 4 primary cords from shoulder angle to the lower suture, second from above at the periphery, and a single intermediate thread in each interspace. There are 16 primary cords on the body-whorl, last 7 closely spaced on the anterior end. Outer-lip strengthened by a heavy varix. Sinus deep, rounded, occupying the shoulder. Parietal tubercle scarcely developed; no other apertural processes.

Height, 6 mm.; diameter, 2.7 mm.

Localities: Altona Bay (type) and Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Etremopsis contigua n. sp. Pl. 5, fig. 6.

Close to *opposita,* but constantly of much smaller size, differing in having fewer, heavier, more broadly rounded axials, a much sharper peripheral angle, and a well developed parietal tubercle. Details of spiral sculpture as in *opposita.* Protoconch typical, tall, polygyrate, of 4½ whorls, tip minute, lower whorls carinated below the middle, last whorl with strong brephic axials.

Height, 4.1 mm.; diameter, 2 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Genus **FILODRILLIA** Hedley, 1922.

Type (o.d.): DRILLIA TRICARINATA Tenison-Woods, Recent, deep-water, New South Wales.

This genus is closely allied to *Etrema;* probably a benthic derivative of it; the only constant differences are the blunt, smooth, paucispiral protoconch, lack of apertural denticles, and thin shell. The sculpture is mostly predominantly spiral, but reticulation is produced in some by the development of moderately strong axials. The posterior sinus is deep, rounded, subtubular, and the outer lip often terminates in a distinct hollow varix. Hedley, in his generic diagnosis, mentions the absence of axial ribs and varix, but several of the species he ascribed to his genus exhibit these features. He further complicated the issue by including such species as *Drillia dilecta* Hedley, 1903, *Pleurotoma (Drillia) dilectoides* Chapman and Gabriel, 1914, and *Filodrillia steira* Hedley 1922. These belong to the *Clavinae,* the first and third respectively are *Maoritomella,* and the second is a *Tomopleura.* Chapman and Crespin's *Filodrillia steiroides* (1928, p. 121) is a *Microdrillia.*

Key to Species of Filodrillia.

Periphery sharply angulate.
    Axials moderately strong; absent from shoulder.
        Slender; walls almost vertical below keel.
            Penultimate with 2-3 spirals below keel .... *turricula* n. sp.
    Axials strong; crossing shoulder.
        Broader; walls undercut below keel.
            Penultimate with 1-2 spirals below keel .... *peramoena* (Ludbrook)
Periphery angulate to subangulate.
    Axials very weak, especially on shoulder.
        Slender; walls undercut on early whorls, but rounded on body-whorl.
            Penultimate with 3 spirals below keel .... *ludbrookae* n. sp.

Filodrillia turricula n. sp. Pl. 5, fig. 8.

Shell slender, with sharply angled periphery, situated above middle; outline of whorls lightly concave on shoulder, straight and almost vertical below. Whorls 6½, including papillate smooth protoconch of 1¾ whorls ending in a few brephic axials. Peripheral spiral narrow; three slightly narrower sharply raised spirals below it, lowest at lower suture, and a further 12 spirals on base and neck; those on neck closely spaced; those on base with interspaces 1 to 1½ times width of spirals. Axials slender, slightly oblique, stopped at peripheral keel and extending weakly over the base, 15 on penultimate. The shoulder bears four very delicate spiral threads. Posterior sinus deep, rounded, subtubular. Outer lip arcuately projecting as a hollow varix.

Height, 6.5 mm.; diameter, 2.4 mm.

Locality: Balcombe Bay, Mornington, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Filodrillia peramoena (Ludbrook, 1941).

1941 *Etrema peramoena* Ludbrook, Trans. Roy. Soc. S. Aust. 65 (1) p. 99, Pl. 5, fig. 23.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Filodrillia ludbrookae n. sp. Pl. 5, fig. 9.

Body-whorl more rounded than in above species; the early whorls only are strongly angulate. Axials much weaker than spirals—numerous spiral threads on shoulder. Whorls 6½, including typical papillate smooth protoconch of 1¾ whorls. Peripheral spiral narrow, at middle of whorls; three spirals of equal strength below it, lowest at lower suture; about 16 much weaker spirals on base and neck. Axials very narrow, weak, oblique and flexuous, strongest from peripheral keel to lower suture, but extending weakly both over shoulder and over base to neck. The shoulder bears six fine crisp spiral threads.

Height, 9 mm.; diameter, 3.75 mm. (holotype).

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Genus **HETEROCITHARA** Hedley, 1922.

Type (o.d.): CLATHURELLA BILINEATA Angas, Recent, New South Wales.

Small ovate-fusiform *Mangeliinae* of stout build, axially costate, crossed by spiral cords and dense granular lirations. Outer lip variced, sinus rounded, occupying the shoulder.

The protoconch is polygyrate, broadly conical, with a small smooth tip followed by several whorls of distinct concave axials.

Heterocithara miocenica n. sp. Pl. 4, fig. 11.

Short fusiform-biconic; spire turreted; angle just below middle. Sculptured with narrowly-crested axial folds, extending from upper suture to over base, but not on the anterior end, 12 per whorl; crossed by narrow, widely-spaced spiral cords and a dense surface pattern of fine lirations, which are rendered granular by still finer and closer axial threads. There are three primary spirals on the spire-whorls, uppermost at the periphery, lowest half immersed at the lower suture, and eight primary spirals on the body-whorl. Protoconch polygyrate, conic, of 3½ whorls, with small, smooth tip, everted and inrolled; remaining whorls with obliquely curved, sharp axials. Adult apertural features unknown, as both available specimens are immature.

Height, 7.9 mm.; diameter, 3.5 mm.

Locality: Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **ANACITHARA** Hedley, 1922.

Type (o.d.): MANGILIA NAUFRAGA Hedley, Recent, Queensland.

Shells resembling *Eucithara* in their upper whorls and sculpture, but with a wide, open aperture without denticles. Typically, the protoconch is rather small, smooth, bluntly rounded, of two whorls, followed by a brephic stage of curved axials, but in a series of four Lower and Middle Miocene New Zealand species, and the Tasmanian Lower Miocene species described below, the protoconch is dome-shaped.

Anacithara janjukiensis n. sp. Pl. 5, fig. 10.

Ovate-fusiform, with tall spire, robust. Whorls convex, slightly shouldered at two-thirds whorl height. Sculptured with broad, heavy, fold-like axials extending from upper suture over the base to the neck, 10 per whorl; crossed by dense regular lirations, about 25 on the penultimate. Outer lip thin at the edge, but heavily variced behind. Sinus shallow, arcuate, occupying the shoulder. There are no apertural processes.

Height, 8 mm.; diameter, 3.5 mm.

Locality: Table Cape, Tasmania (Finlay coll.) (Janjukian) Lower Miocene.

Genus EUCITHARA Fischer, 1883.

Type (monotypy): MANGELIA STROMBOIDES Reeve, Recent, Philippines.

This well known tropical genus is represented abundantly in the Australian Recent Fauna.

Eucithara glabra (Harris, 1897).

1897 *Mangilia (Cythara) glabra* Harris, Cat. Tert. Moll. Brit. Mus., p. 58, Pl. 3, figs. 10a-b.
1898 *Mangilia (Cythara) glabra,* Tate, Proc. Roy. Soc. N.S.W. 31, p. 399.

Locality: Muddy Creek, upper beds, Victoria (Kalimnan) Lower Pliocene.

(*Eucithara subglabra* Chapman & Crespin 1928), Rec. Geol. Surv. Victoria 5, pt. 1, p. 121, Pl. 9, fig. 58. Sorrento Bore, 850 feet, Victoria (Balcombian). I have not seen this species, but judging from the original figure and description it belongs to the *Pyrenidae.*

(*Mangelia gracililirata* Tenison-Woods, 1877), Proc. Roy. Soc. Tasm., p. 106. Table Cape, Tasmania (Janjukian) is not a Turrid. I have not seen topotypes, but judging from May's figure of a co-type (1919, Proc. Roy. Soc. Tasmania, for 1918, Pl. 10, fig. 15) and a specimen from Spring Creek, lower beds, the species is a Pyrenid, probably *Retizafra.*

Subfamily DAPHNELLINAE.

Genus DAPHNELLA Hinds, 1844.

Type (s.d. Herrmannsen 1847): PLEUROTOMA LYMNAEFORMIS Kiener, Recent, Indian Ocean.

This well known, widely distributed Turrid genus has a polygyrate, pointed, elaborately diagonally cancellated, or "engine-turned" sinusigerid protoconch, and a sutural sinus which is moderately deep, more or less vertically descending and then suddenly produced forwards like a reversed letter "L." The shells are elongate-ovate to ovate-fusiform.

Daphnella cuspidata (Chapple, 1934).

1934 *Guraleus cuspidatus* Chapple, Mem. Nat. Mus. Melb. 8, p. 164.

Locality: Balcombe Bay, Mornington (type); Altona Bay (C. R. Laws coll.) Victoria (Balcombian) Middle Miocene.

A series of topotypes in the Finlay collection shows this species to have a diagonally cancellated sinusigerid protoconch of four whorls, not smooth as described by Chapple. The presence of a strong labial fold causes the sinus to be slightly atypical in being curved forwards at the suture, not vertically descending. In shape, excavated at the neck, this and the following species resemble *Asperdaphne,* but they are nearer to *Daphnella* in essentials.

Daphnella chapplei n. sp. Pl. 6, fig. 6.

Differs from *cuspidata* in having twice as many axials and more regular spiral cords. Axials narrowly rounded, oblique, 19 per whorl, but subobsolete over the penultimate and body-whorls. Surface crowded with linear-spaced, narrow, rounded cords, about 19 on penultimate, those on shoulder much finer, and about 50 on the body-whorl. Apertural features as in *cuspidata,* but with a weaker labial fold resulting in a more normal Daphnellid sinus.

Height, 12.2 mm.; diameter, 4.3 mm.

Locality: Muddy Creek, lower beds, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Genus **ASPERDAPHNE** Hedley, 1922.

Type (o.d.): DAPHNELLA VERSIVESTITA Hedley, Recent, New South Wales.

Daphnellids with a blunt paucispiral, spirally ridged protoconch instead of a tall, polygyrate, diagonally cancellated "Sinusigera."

The genus occurs Recent in both Australia and New Zealand, but the following are the first Tertiary members to be described.

Asperdaphne balcombensis n. sp. Pl. 6, fig. 7.

Fusiform, with convex whorls, excavated base and moderately long, flexed and recurved anterior canal. Sculptured with numerous sharply raised, rounded axials, crossed by crisp primary and secondary spiral cords. Protoconch of $2\frac{1}{2}$ rounded, finely striated whorls, tip small, inrolled; last whorl with a few weak, irregular axials; terminated by a thin sinuous rim. Shoulder slight, at four-fifths whorl height, sculptured with 5-6 fine spiral lirations crossed by arcuate threads which follow the curve of the sinus. The axials run from the shoulder angle over the base to the anterior end, 20 per whorl. On the penultimate these are crossed by 6 crisp, narrow primary cords with a thread in each interspace. On the body-whorl there are about 16 primary cords. The anterior end bears 6 strong cords, but no axials. Outer lip thin, sinus sutural, typical, reversed "L"-shaped, but not deep.

Height, 11 mm.; diameter, 4.25 mm.

Locality: Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Asperdaphne contigua n. sp. Pl. 6, fig. 8.

Broader, more squat-spired than *balcombensis,* with similar sculpture but fewer axials and spirals. Protoconch similar to that of above species, but more elevated. Axials 12 per whorl, curving half way over concave, smooth shoulder, which is at four-fifths whorl height. Below, the axials extend over the base to the anterior end. There are four narrow but distinct primary spiral cords on the spire-whorls, with a thread in each interspace, and two above the shoulder angle between the uppermost primary and the smooth sinus area. The anterior end bears 9 strong cords, but no axials. Other features as in *balcombensis.*

Height, 6.8 mm.; diameter, 3 mm.

Locality: Altona Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Subgenus **ASPERTILLA** n. subgen.

Type: DRILLIA LEGRANDI Beddome, 1883, Recent, Tasmania.

The curious protoconch of the species described below, with its peg-like initial whorl, is found also in *Drillia legrandi* Beddome, Recent, Tasmania (protoconch figured by Hedley, 1900, Proc. Linn. Soc. N.S.W., Pl. 25, figs. 1 and 2). Both species have open clathrate sculpture, as in *Veprecula* and *Nepotilla,* and a deeper sinus than in *Asperdaphne,* although not so deep as in the two above mentioned genera.

Asperdaphne (Aspertilla) exsculpta n. sp. Pl. 6, fig. 9.

Shell small, broad, with angulate whorls, deeply excavated at the sutures. Protoconch papillate, of 2½ whorls, tip exserted, peg-like, the whole sculptured with 10 spiral lirations abruptly terminated at the first axial of the post-nuclear sculpture. Axials heavy, rounded, 10 per whorl, crossed by sharply raised spiral cords and interstitial threads. Spire-whorls with three spiral cords, body-whorl with six, each interspace bearing a single thread. Additional to these, there is one thread on the concave shoulder just above the uppermost cord, and eight strong, closely spaced cords on the anterior end. Sinus sutural, moderately deep.

Height, 3.9 mm.; diameter. 2.15 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Genus **FENESTRODAPHNE** n. gen.

Type: F. PULCHRA n. sp. (Adelaidean) South Australia, Lower Mid-Pliocene.

The above new genus is proposed for a solitary Daphnellid which fits no described genus. It is nearest to *Asperdaphne,* but has a very different protoconch, which is paucispiral, small, rounded, flattened on top, of 1½ whorls, with the tip inrolled. The whole closely axially costate, crossed by two weak spiral keels. The protoconch passes imperceptibly into the post-nuclear sculpture by the addition of spirals, one above and another between the original two. The adult sculpture is of closely spaced, narrow spiral cords and threads, crossed by axial threads. The outer lip is thin, and the sinus sutural, not very deep.

Fenestrodaphne pulchra n. sp. Pl. 6, fig. 10.

Small, ovate, with convex whorl outlines, weakly shouldered on the spire-whorls at about four-fifths whorl height by the uppermost and weakest of four narrow primary spiral cords. There is an intermediate thread in each interspace. On the body-whorl there are ten primary cords, and one, sometimes two, threads in the interspaces. The anterior end bears about ten linear-spaced spiral cords. The surface is delicately fenestrated by the crossing of the secondary spirals and closely spaced axial threads.

Height, 6.1 mm.; diameter, 3 mm.

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll) (Adelaidean) Lower Mid. Pliocene.

Genus **VEPRECULA** Melvill, 1917.

Type (o.d.): CLATHURELLA SYKESII Melvill & Standen, Recent, Gulf of Oman, 156 fath.

The species described below is not a typical *Veprecula,* but it may rest here until others resembling it are found. It has a tall, polygyrate, narrowly-conic, sinusigerid protoconch, but this is sculptured with delicate diagonal cancellations as in *Daphnella,* not diagonally lamellate as in typical *Veprecula.* Also, the sinus is shallower than in *Veprecula* and the shell is broader, more stumpy, with shorter spire and canal. Except for the polygyrate sinusigera the species could be placed just as readily in *Asperdaphne.*

?Veprecula adelaidensis n. sp. Pl. 6, fig. 11.

Shell small, broadly fusiform, sculptured with heavy rounded axials crossed by a few strong cords. Surface cancellated by subsidiary spiral and axial threads. There are four primary spirals on the spire-whorls. The third one down is much the strongest and forms the peripheral carina at one third whorl height. About 21 primary spirals on body-whorl, 11 of them linear-spaced on the neck; four subsidiary threads on the shoulder and one or two in the interspaces of the primaries. Axials very heavy, rounded, strongly projecting, vertical, 8 per whorl. The sinus is shaped as in *Veprecula,* although not so deep, but it is deeper than in *Asperdaphne.*

Height, 6.7 mm.; diameter, 3.5 mm. (holotype).

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Genus **PSEUDEXOMILUS** n. gen.

Type: P. CAELATUS n. sp. (Adelaidean) Lower Mid-Pliocene, South Australia.

The genus *Exomilus* was provided for a group of small subcylindrical Turrids with a concave base, latticed sculpture, shallow subsutural sinus and a somewhat quadrangular aperture. Of the species ascribed to the genus by its author (Hedley 1922, pp. 333-335) *Mangilia cancellata* Beddome, 1882, seems to be the only one with apical characters resembling those of the genotype. That is with a small, oblique, inrolled first whorl and the second whorl larger and overhanging the third. The top of the protoconch in the genotype is flat to concave, with a few weak crenulations on the carinate edge. The species *Drillia pentagonalis* and *telescopialis*, both of Verco 1896, have a different style of protoconch, and further divergences in Hedley's assemblage are shown by *Terebra dyscritos* Verco, 1906, and *Mangilia anxia* Hedley, 1909, respectively. The species *Mangilia spica* Hedley, 1907, along with *Etrema trophonalis* Chapman and Crespin, 1928, are not Turrids, but Pyrenids of the same group as *Aesopus semicostatus* Tenison-Woods, 1880. These may be located in *Retizafra*.

The species described below seems to have some affinity with the several groups at present covered by *Exomilus*, but its apical characters are so different that it would be unwise to burden an already overtaxed genus by the inclusion of a further divergent member.

The new genus *Pseudexomilus* is provided for the Abattoirs species. It has a 2½-whorled blunt protoconch, tip smooth, remaining two whorls radially costate. The shell is tall-spired, *Terebra-like,* sculptured with wavy spiral cords crossed by obsolescent axials. The sinus is Daphnellid, descending obliquely and recurrently from the suture, more or less straight, but narrowly rounded at the apex before descending obliquely forward below the weakly defined shoulder.

Pseudexomilus caelatus n. sp. Pl. 6, fig. 12.

Protoconch of 2½ whorls, tip bluntly rounded, smooth, following whorls much larger, strongly convex, radially ribbed, 13 radials per whorl. Post-nuclear whorls with strong, flat-topped, sharply raised wavy cords, four on first whorl, six on fourth whorl, nine on penultimate and twenty-two on body-whorl, nine of which are on the anterior end. Axials obsolescent, irregularly but weakly developed throughout, about ten per whorl. Aperture (better shown in paratype) quadrangular. Outer lip not thickened, but lirate within. Anterior canal short, subtubular, not sinused. Anal sinus as described above.

Height, 11.6 mm.; diameter, 3.9 mm. (holotype).

Locality: Abattoirs Bore, 400-500 ft., Adelaide, South Australia (Finlay coll.) (Adelaidean) Lower Mid. Pliocene.

Genus **RUGOBELA** Finlay, 1924.

Type (o.d.): PTYCHATRACTUS TENUILIRATUS Suter (Awamoan) Middle Miocene, N.Z.

In my "New Zealand Recent and Fossil Mollusca of the Family Turridae" I gave reasons for the inclusion of this genus in the subfamily *Daphnellinae*. The genus lacks both the characteristic diagonally cancellated protoconch and the reversed "L"-shaped sinus, but the presence of weak plications near the base of the pillar accords with the typical genus of the subfamily.

In Australia the genus occurs only in the (Janjukian and Balcombian) Lower and Middle Miocene, but in New Zealand, the probable place of origin of the genus, the range extends from the (Kaiatan) Lower Oligocene to the (Awamoan) Middle Miocene.

Key to Species of Rugobela.

Subsutural cord strong; shoulder rather deeply concave.
  Peripheral angle above middle.
    Axials 20 per whorl .... *exsculpta* n. sp.
    Axials 14-15 per whorl .... *columbelloides* (T.-Wds.)

Subsutural cord weak; shoulder broad and shallow.
  Peripheral angle below middle.
    Axials 10-12 per whorl .... *conospira* (Tate)

Rugobela columbelloides (Tenison-Woods, 1877).

1877 *Daphnella columbelloides* Ten.-Woods, Proc. Roy. Soc. Tas. for 1876, p. 105.
1898 *Daphnella columbelloides:* Tate, Proc. Roy. Soc. N.S.W. 31, p. 393.
1919 *Daphnella columbelloides.:* May, Proc. Roy. Soc. Tas. for 1918, p. 72, Pl. 10, fig. 14.
1877 *Thala marginata* Tenison-Woods, Proc. Roy. Soc. Tas. for 1918, p. 72 (cited as syn. of *columbelloides).*

Locality: Table Cape, Tasmania (Janjukian) (type) Lower Miocene (Finlay coll.).

Rugobela exsculpta n. sp. Pl. 6, fig. 5.

Resembles *columbelloides*, but with more numerous axials, which are persistent over the body-whorl (obsolescent over body-whorl in *columbelloides).* The sutural cord is heavy, as in *columbelloides,* but the shoulder is broad, as in *conospira.* Axials strong, rounded, slightly oblique, 20 on body-whorl, extending from shoulder-angle to lower suture, not extending over base. Spiral cords moderately strong, 5 to 6 on spire-whorls. Interspaces increasing to two or three times width of cords over middle area of base. Whorls 7½, including smooth, polished, polygyrate protoconch of 3½ whorls.

Height, 7.2 mm. (incomplete); diameter, 3.6 mm. (holotype).

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Rugobela sp.

Locality: Aldinga (Lower), South Australia (Janjukian). One example only, definitely of the genus, but too worn for specific determination .

Rugobela conospira (Tate, 1898).

1898 *Cordieria conospira* Tate, Proc. Roy. Soc. N.S.W. 31, p. 396, Pl. 19, fig. 12.

Locality: Muddy Creek, lower beds; Balcombe Bay, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Note: Tate's River Murray Cliffs, S. Australia, and Gellibrand River, Victoria, records probably refer to *columbelloides* Ten.-Woods.

Genus TELEOCHILUS Harris, 1897.

Type (o.d.): DAPHNELLA GRACILLIMA Tenison-Woods. Janjukian (Lower Miocene) Tasmania.

So far as is known, *Teleochilus* is exclusively South Eastern Australian. It occurs in both the Janjukian and Balcombian, and has living near relatives in *Teleochilus royanus* Iredale, 1924, and *Benthofascis* Iredale, 1936. The latter covers two benthic New South Wales species, *Bathytoma biconica* Hedley, 1903, and *B. sarcinula* Hedley, 1905.

Teleochilus is a slender, cylindrical Daphnellid with a long aperture and a large blunt protoconch of 1½ depressed spirally lirate whorls. The sinus is no more than a minute sutural indentation, but the lower inner face of the pillar bears distinct Daphnellid plications. The post-nuclear sculpture is of prominent spirals, the early whorls sometimes crossed by weak axials. The presence of pillar plications in *Teleochilus* as well as the moderately-deep sutural sinus in the assumed Recent ally *Benthofascis* indicates these genera as members of the subfamily *Daphnellinae.*

Iredale's *Teleochilus royanus,* by its punctate, not spirally ridged protoconch, and dominance of the axial over the spiral element in the adult sculpture ,is obviously separable from the fossil series. The new generic name *Litachilus* is here proposed for Iredale's species.

Key to Species of Teleochilus.

- Protoconch bearing 6 distinct spirals.
  - Shell slender, subcylindrical. Aperture capacious.
    - Spiral interspaces wide.
      - Spire-whorls with 5 flat-topped spirals, lower two bifurcated.
        - Axial folds broad, distinct .... *gracillimus* (T.-Wds.)
    - Spiral interspaces linear.
      - Spire-whorls with 12-14 fine spirals.
        - Axials obsolete .... *denseliratus* n. sp.
  - Shell ovate-biconic.
    - Spire-whorls with 5 pairs of flat-topped spirals.
      - Axials obsolete .... *duplicatus* n. sp.
- Protoconch bearing 8-9 spirals.
  - Spirals on protoconch distinct.
    - Shell slender, subcylindrical. Base of aperture narrowly contracted.
      - Spiral interspaces moderately wide.
        - Spire-whorls with 8-9 flat-topped spirals.
          - Axial folds weak .... *balcombensis* n. sp.
  - Spirals on protoconch faint: almost smooth.
    - Shell ovate-biconic. Aperture small.
      - Spire-whorls with 9-10 linear-spaced spirals.
        - Axials obsolete .... *comptus* n. sp.

Teleochilus gracillimus (Tenison-Woods, 1877).

1877 *Daphnella gracillima* Ten.-Woods, Proc. Roy. Soc. Tas. for 1876, p. 106.

Height, 21 mm.; diameter, 7.4 mm. (topotype).

Locality: Table Cape, Tasmania (Janjukian) Lower Miocene.

Tenison-Woods' original species (1877) from Table Cape, is a strongly sculptured shell, very distinct from the Muddy Creek shell (described below) which was erroneously merged with *gracillimus* by both Tenison-Woods (1879) and Harris (1897).

True *gracillimus* has few, rather distant, flat-topped, strong spiral cords (5 on spire-whorls), rather strong, broad, axial folds, and a capacious aperture.

Teleochilus denseliratus n. sp. Pl. 3, fig. 10.

1879 *Daphnella gracillima:* Ten.-Woods, Proc. Linn. Soc. N.S.W. 3, p. 226, Pl. 20, fig. 10. Muddy Creek (Lr.) not of Ten.-Wds. 1877.

1897 *Teleochilus gracillimum:* Harris Cat. Tert. Moll. Brit. Mus. 1, p. 65, not of Ten.-Wds. 1877.

1896 *Daphnella gracillima:* Cossmann, Ess. Pal. Comp. 2, p. 94, fig. 15 (protoconch).

1899 *Teleochilus gracillimus:* Cossmann, Ess. Pal. Comp. 3, p. 191, Pl. 8, fig. 4. Not of Ten.-Wds. 1877.

1906 *Daphnobela gracillima:* Cossmann, Ess. Pal. Comp. 7, p. 224. Not of Ten.-Wds. 1877.

Shell very large for the genus, slender, subcylindrical. Aperture more than half height of shell. Post-nuclear sculpture of six flat-topped, linear-spaced cords on first whorl, doubled on next by bifurcation of all cords, and increased to 14 on penultimate; body-whorl with about 58 weak, irregularly developed, narrow cords. There is a slight shoulder sulcus below the second cord from the suture, being marked by a wider interspace, equal to the width of two cords. Axial sculpture obsolete.

Height, 29.3 mm.; diameter, 8.9 mm. (holotype).

Height, 22.6 mm.; diameter, 8.0 mm. (paratype).

Locality: Muddy Creek, lower beds (type); Grice's Creek, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

This species is readily distinguished from the Table Cape, Tasmanian *gracillimus* by its dense sculpture of far more numerous linear-spaced spiral cords, larger size, and the flat, not rounded, cords on the protoconch. In both *gracillimus* and in this new species there are six cords on the protoconch.

Teleochilus duplicatus n. sp. Pl. 6, fig. 2.

Shell of moderate size, ovate-biconic. Aperture almost two-thirds height of shell. Whorls strongly convex, greatest convexity just above the middle. Protoconch sculptured with six strong, rounded spiral cords. Post-nuclear whorls with five pairs of strong, flat-topped spiral cords, one pair submargining suture and separated from the remaining four by a moderately deep, narrow sulcus. On the body-whorl there are eleven pairs of cords and nine single cords on the anterior end. Each pair of cords is linear-spaced, but the interspaces between the pairs are half the width of a cord or more. There is no axial sculpture.

Height, 14.1 mm.; diameter, 5.1 mm. (holotype).

Locality: Grice's Creek, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

Teleochilus balcombensis n. sp. Pl. 6, fig. 1.

Shell of moderate size, slender, subcylindrical, but with the spire-whorls noticeably convex. Aperture about half height of shell. Post-nuclear sculpture of 8-9 flat-topped, moderately strong cords, with interspaces averaging half their width. Two to four cords on the median area of the body-whorl are bifurcated by a linear groove. There are 26 primary cords on the body-whorl. Shoulder sulcus distinct, situated below the first subsutural cord. Axial sculpture of weak, wide-spaced folds on first 2-3 whorls.

Height, 18 mm.; diameter, 6 mm. (holotype).

Locality: Balcombe Bay, Mornington, Victoria (Finlay coll.) (Balcombian) Middle Miocene.

This species is close to *gracillimus,* but differs in having more convex spire-whorls, more numerous and less prominent spiral cords, weaker axials, and a more narrowly contracted base. Also the protoconch bears nine spiral cords, as against six in *gracillimus* and *denseliratus.*

Teleochilus comptus n. sp. Pl. 6, fig. 3.

Shell small, ovate-biconic. Aperture almost two-thirds height of shell. Post-nuclear sculpture of 9-10 rather broad, flat-topped cords, with linear interspaces. Shoulder sulcus, a slightly wider interspace between cords 2 and 3 from the suture. About 34 cords on the body-whorl, 10 of which are on the neck. Protoconch almost smooth, showing 8-9 very faint spiral threads. Aperture much smaller than in other species. Lower inside portion of pillar with 7-8 oblique characteristic Daphnellid plications.

Height, 12.7 mm.; diameter, 5 mm. (holotype).

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

Genus **SYNGENOCHILUS** n. gen.

Type: S. RADIAPEX n. sp. (Janjukian) Lower Miocene, Victoria.

This genus resembles the Cancellarid *Inglisella,* but is actually a small, heavily sculptured Daphnellid close to *Teleochilus,* but differing from that genus in having an axially ridged protoconch instead of spiral cords.

Syngenochilus radiapex n. sp. Pl. 6, fig. 4.

Shell small, robust, ovate, with bluntly rounded apex. The sculpture consists of heavy rounded axials crossed by narrow spiral cords. The outline of the spire-whorls is stepped at the subsutural sulcus, below which it is straight and vertical. Aperture narrow, about half height of shell. Protoconch large, broad, dome-shaped, flattened on top, of two whorls, first smooth, second with 14 strong, regularly spaced axial ribs. Post-nuclear whorls sculptured with 14 strong rounded axials, vertical to slightly recurrently oblique, extending from suture to suture, but rapidly fading out on base. All post-nuclear whorls crossed by crisp, narrow spiral cords, 10 on spire-whorls and 28 on body-whorl. There are four or five characteristic weak Daphnellid plications on the inner side of the pillar.

Height, 7.25 mm.; diameter, 3.25 mm.

Locality: Torquay, upper beds, Victoria (Finlay coll.) (Janjukian) Lower Miocene.

PROTOCONCHS OF AUSTRALIAN TERTIARY TURRIDAE.

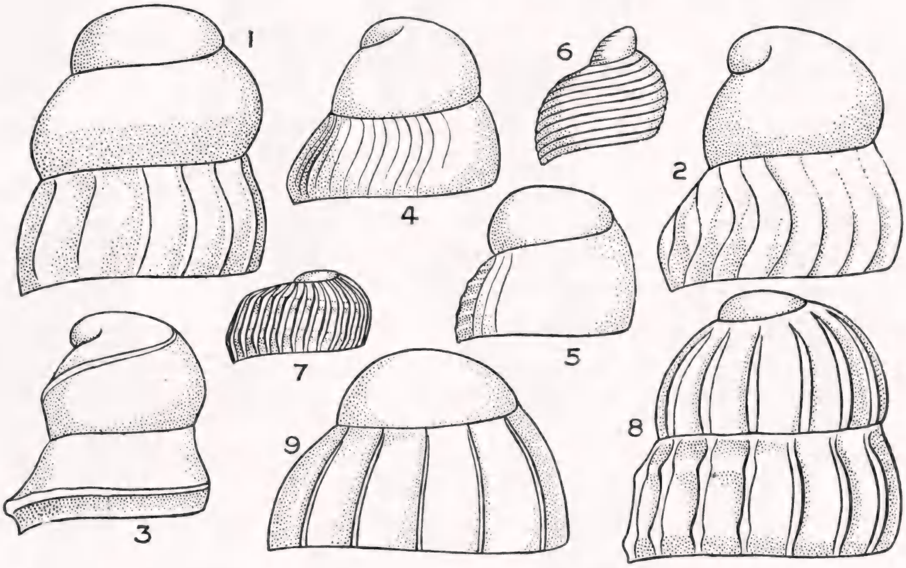


Fig. 1. *Xenuroturris (Veruturris) quadricarinatus* n. subgen. & sp. 2. *Optoturris optatus* (Harris) n. gen. 3. *Coronasyrinx venusta* n. gen. & sp. 4. *Cryptoborsonia pleurotomella* n. gen. & sp. 5. *Guraleus (Paraguraleus) balcombensis* n. subgen. & sp. 6. *Asperdaphne (Aspertilla) exsculpta* n. subgen. & sp. 7. *Fenestrodaphne pulchra* n. gen. & sp. 8. *Pseudexomilus caelatus* n. gen. & sp. 9. *Syngenochilus radiapex* n. gen. & sp. All figures × 30.

REFERENCES.

CHAPMAN, F., & CRESPIN, I., 1928. The Sorrento Bore, Mornington Peninsula, with a description of new or little-known fossils. *Rec. Geol. Surv. Victoria* 5 (1), Pt. 3, pp. 87-196.

CHAPMAN, F., & GABRIEL, C. J., 1914. Descriptions of New and Rare Fossils obtained by deep boring in the Mallee. Pt. 2. Mollusca. *Proc. Roy. Soc. Victoria* (n.s.) 26 (2) pp. 301-330.

CHAPMAN, F., & SINGLETON, F. A., 1925. The Tertiary Deposits of Australia. *Proc. Pan. Pac. Sci. Cong.* (Australia, 1923) 1, pp. 985-1024.

CHAPPLE, E. H., 1934. Additions to the Tertiary Mollusca of Victoria. *Mem. National Mus. Melbourne,* No. 8, pp. 162-165.

CHAPPPLE, E. H., 1941. New Species of Tertiary Mollusca from Victoria. *Mem. National Mus. Melbourne,* No. 12, pp. 119-124.

COSSMANN, M., 1896. Essais de Paléoconchologie Comparee, 2.

DENNANT, J., & KITSON, A. E., 1903. Catalogue of the Described Species of Fossils (Except Bryozoa and Foraminifera) in the Cainozoic Fauna of Victoria, South Australia and Tasmania. *Rec. Geol. Surv. Vict.* 1, Pt. 2, pp. 89-147.

HARRIS, G. F., 1897. Catalogue of Tertiary Mollusca in British Museum, Pt. 1. The Australasian Tertiary Mollusca. Lond. pp. 37-65.

HEDLEY, C., 1922. A Revision of the Australian Turridae. *Rec. Austr. Mus.* 13, pp. 213-359.

LUDBROOK, N. H., 1941. Gastropoda from the Abattoirs Bore, Adelaide, South Australia. *Trans. Roy. Soc. S. Aust.* 65 (1), pp. 79-102.

MAY, W. L., 1919. Critical Remarks on the Table Cape Fossil Mollusca in the Johnston Collection. *Proc. Roy. Soc. Tasmania* for 1918, pp. 69-73.

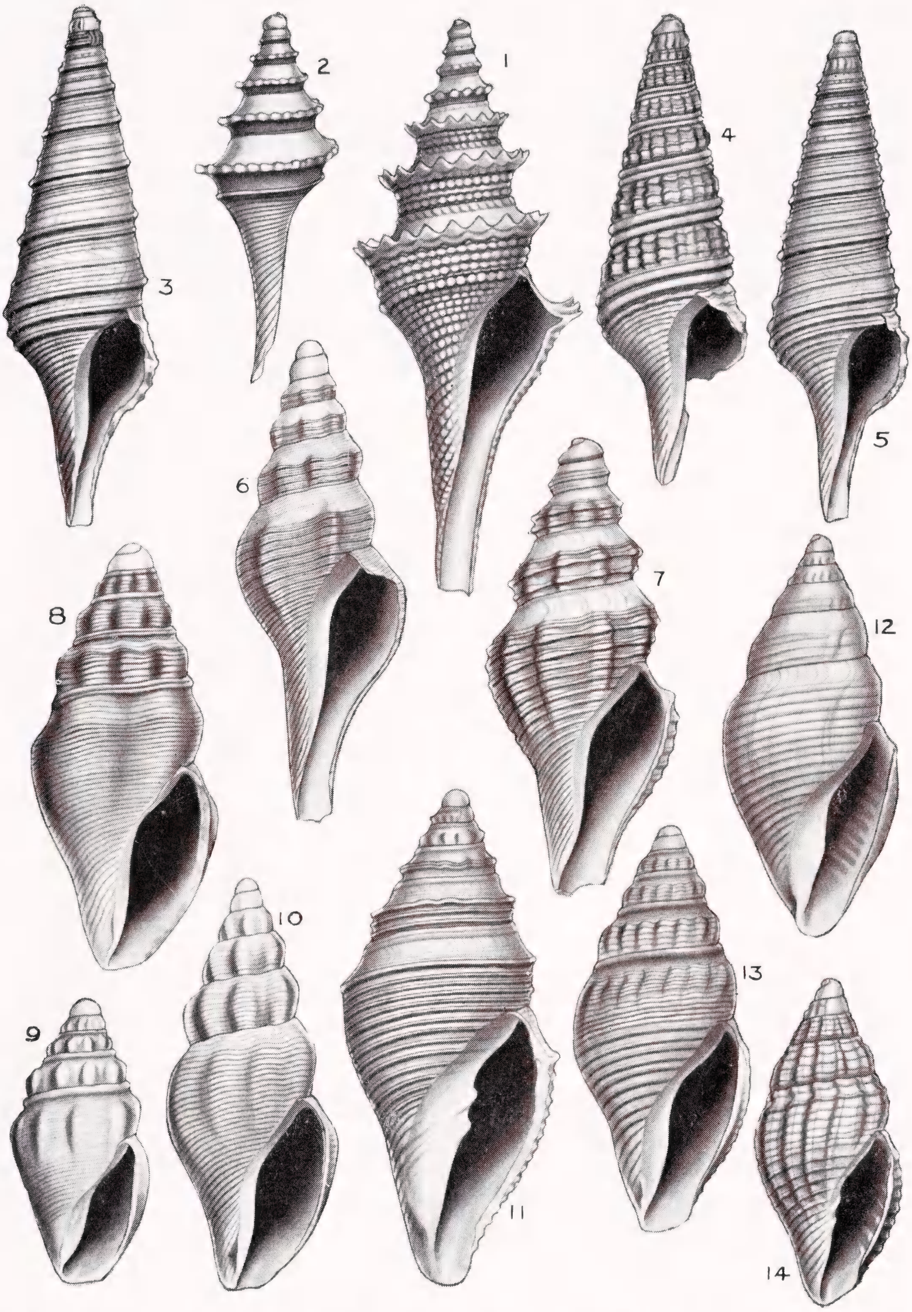
POWELL, A. W. B., 1942. The New Zealand Recent and Fossil Mollusca of the Family Turridae. *Bull 2, Auck. Inst. and Mus.,* pp. 1-188.

SINGLETON, F. A., 1938. Correlation of Tertiary Rocks of Australia and New Zealand. *Rep. Austr. and N.Z. Assoc. Adv. Sci. (Auckland Meeting,* 1937) *Rep. of Research Committees,* Sec. C, p. 3.

SINGLETON, F. A., 1941. The Tertiary Geology of Australia. *Proc. Roy. Soc. Vict.* 53 (N.S.) Pt. 1, pp. 1-125.

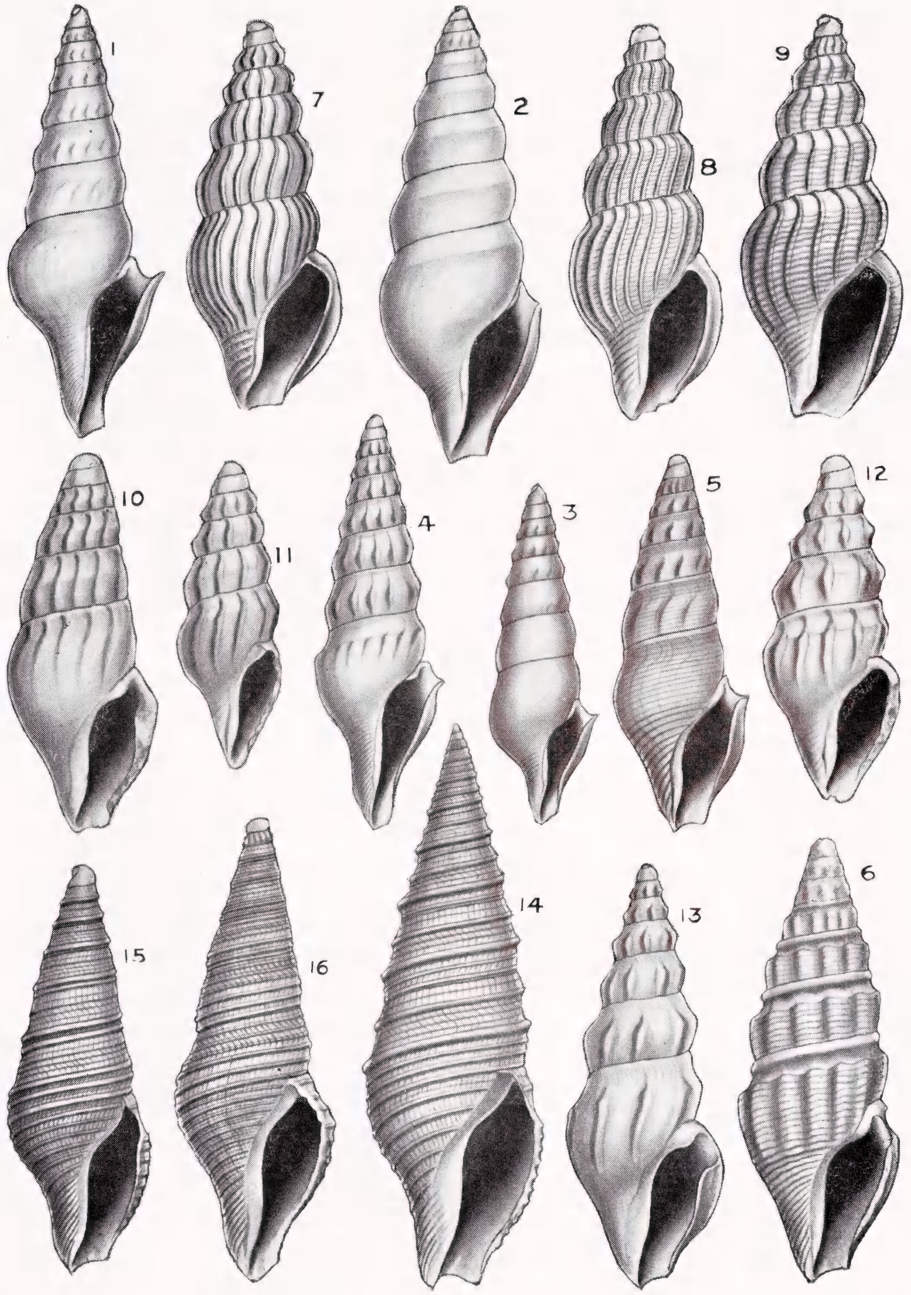
SINGLETON, F. A., 1943. An Eocene Molluscan Fauna from Victoria. *Proc. Roy. Soc. Vict.* 55, Pt. 2, pp. 267-278.

PLATE 1.



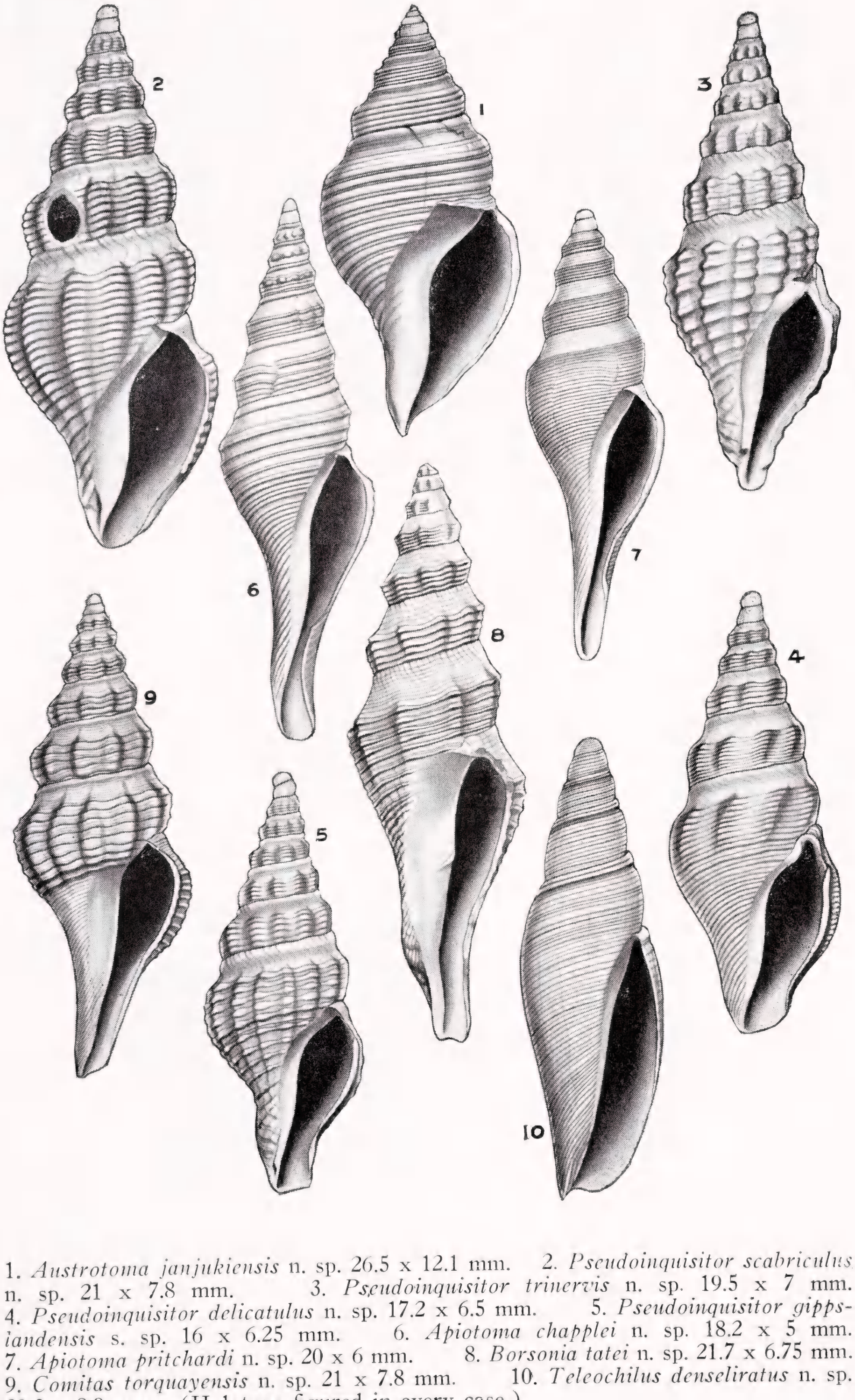
1. *Coronasyrinx venusta* n. gen. & sp. 14.8 x 5.8 mm. 2. *Coronasyrinx semiplana* n. sp. 9.6 x 3.9 mm. 3. *Xenuroturris (Veruturris) tomopleuroides* n. subgen. & sp. 17.5 x 5.5 mm. 4. *X. (Veruturris) bisculptus* n. sp. 13.9 x 4.5 mm. 5. *X. (Veruturris) quadricarinatus* n. sp. 14.5 x 4.2 mm. 6. *Comitas pseudoclarae* n. sp. 14 x 5 mm. 7. *Comitas (Carinacomitas) aldingensis* n. sp. 6.8 x 2.9 mm. 8. *Scrinium duplicatum* n. sp. 10 x 4.5 mm. 9. *Scrinium nanum* n. sp. 6.1 x 3 mm. 10. *Scrinium haroldi* n. sp. 9 x 3.9 mm. 11. *Borsonia torquayensis* n. sp. 9.8 x 4.45 mm. 12. *Cryptoborsonia pleurotomella* n. gen. & sp. 10 x 4.5 mm. 13. *Cryptoborsonia rugobela* n. sp. 8.5 x 3.9 mm. 14. *Mitrithara fenestrata* n. sp. 6 x 2.5 mm. (Holotype figured in every case.)

PLATE 2.



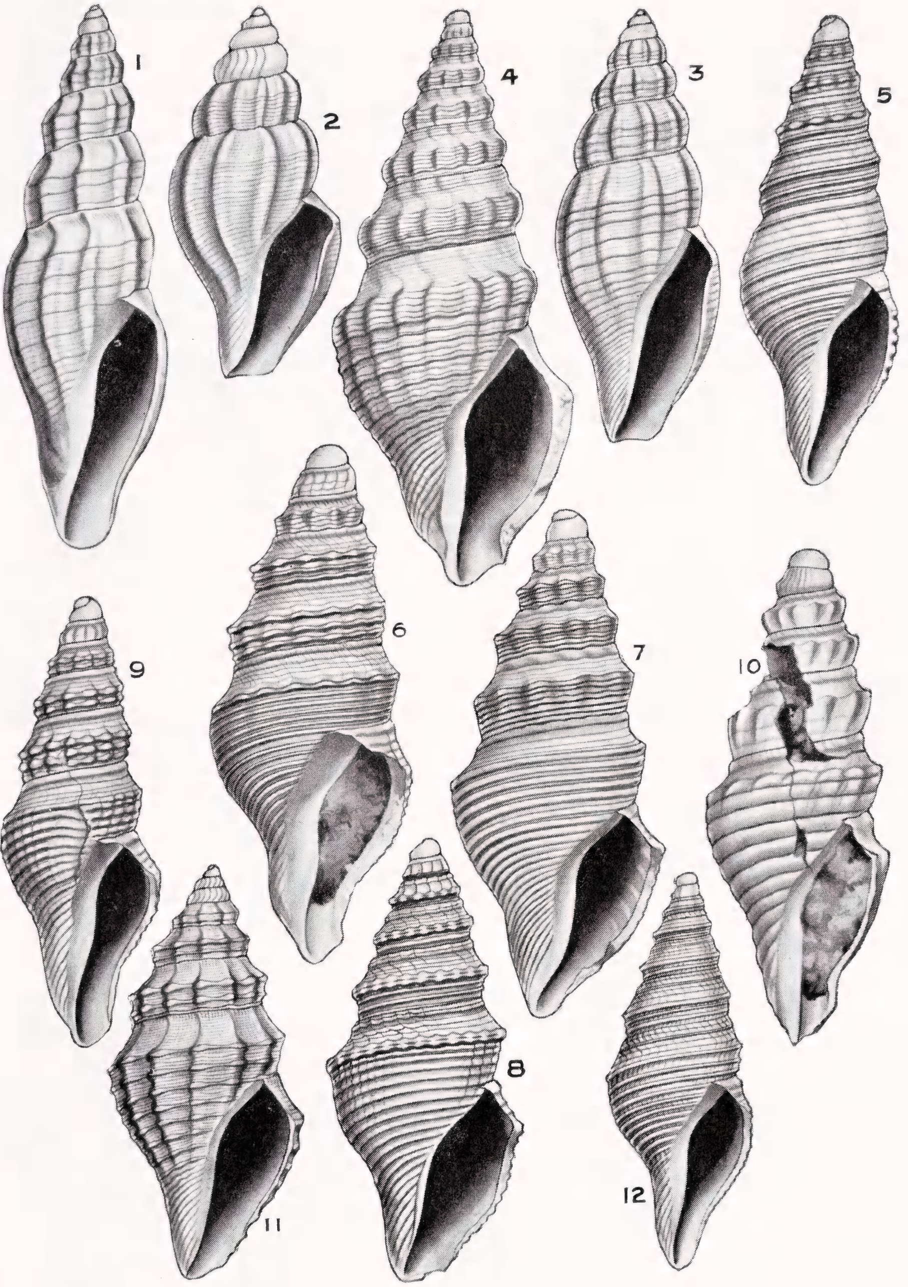
1. *Austroclavus glaber* n. sp. 12.25 x 4.6 mm. 2. *Austroclavus brevicaudalis* n. sp. 16 x 5.8 mm. 3. *Austroclavus teres* n. sp. 10 x 3.1 mm. 4. *Austroclavus lygdinopsis* n. sp. 12 x 3.9 mm. 5. *Splendrillia formosa* n. sp. 10.5 x 3.9 mm. 6. *Splendrillia adelaidae* n. sp. 11.3 x 4.15 mm. 7. *Syntomodrillia venusta* n. sp. 7.9 x 3 mm. 8. *Syntomodrillia complexa* n. sp. 8.9 x 3.6 mm. 9. *Syntomodrillia compta* n. sp. 9 x 3.9 mm. 10. *Syntomodrillia ludbrookae* n. sp. 7 x 2.7 mm. 11. *Syntomodrillia obsoleta* n. sp. 5.3 x 1.9 mm. 12. *Syntomodrillia circinata* n. sp. 6 x 2.5 mm. 13. *Syntomodrillia (Hauturua) exuta* n. sp. 15.6 x 6 mm. 14. *Tomopleura ludbrookae* n. sp. 14.9 x 4.6 mm. 15. *Maoritomella nutans* n. sp. 12.2 x 4.5 mm. 16. *Maoritomella equispiralis* n. sp. 12.5 x 4.2 mm. (Holotype figured in every case.)

PLATE 3.



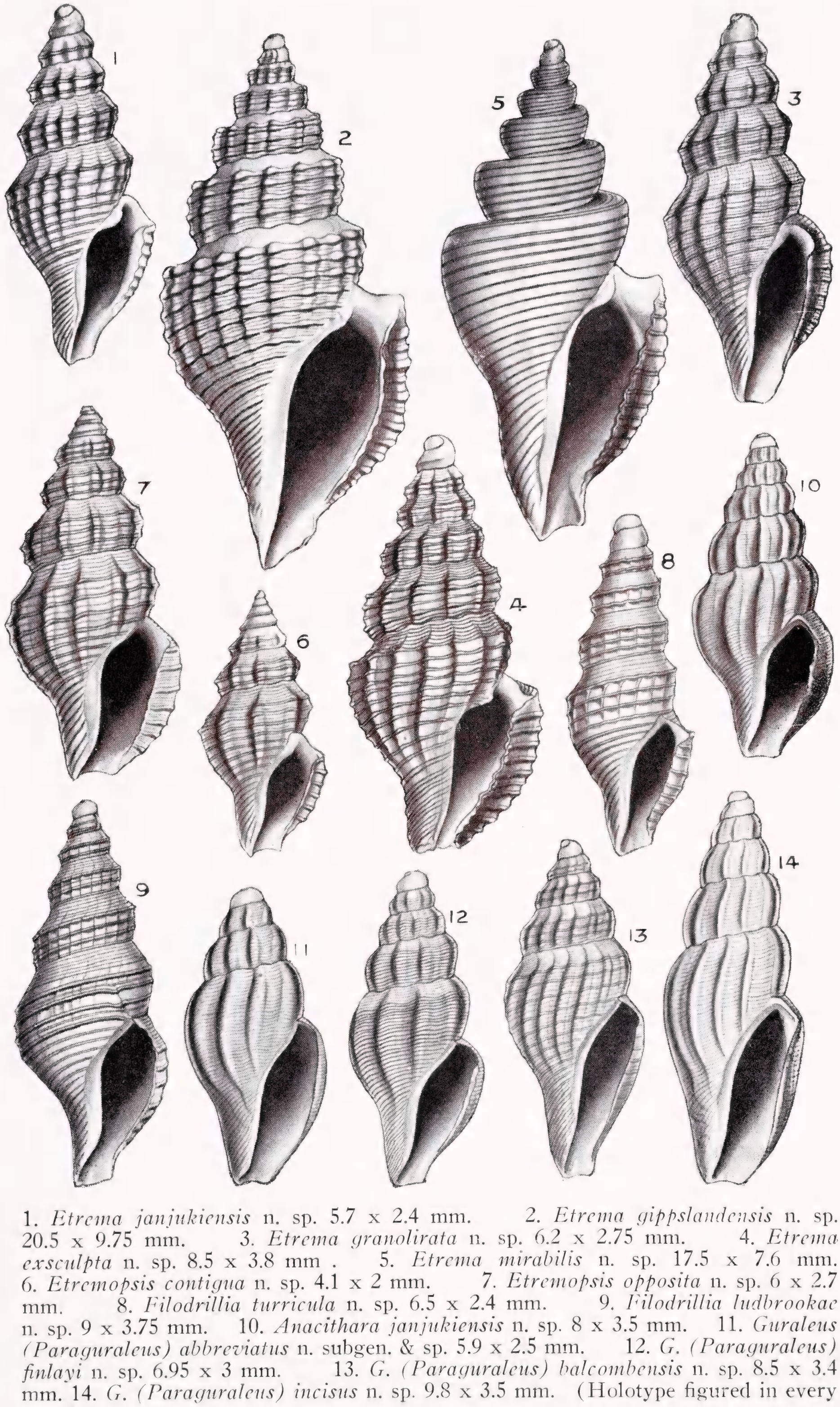
1. *Austrotoma janjukiensis* n. sp. 26.5 x 12.1 mm. 2. *Pseudoinquisitor scabriculus* n. sp. 21 x 7.8 mm. 3. *Pseudoinquisitor trinervis* n. sp. 19.5 x 7 mm. 4. *Pseudoinquisitor delicatulus* n. sp. 17.2 x 6.5 mm. 5. *Pseudoinquisitor gippslandensis* s. sp. 16 x 6.25 mm. 6. *Apiotoma chapplei* n. sp. 18.2 x 5 mm. 7. *Apiotoma pritchardi* n. sp. 20 x 6 mm. 8. *Borsonia tatei* n. sp. 21.7 x 6.75 mm. 9. *Comitas torquayensis* n. sp. 21 x 7.8 mm. 10. *Teleochilus denseliratus* n. sp. 29.3 x 8.9 mm. (Holotype figured in every case.)

PLATE 4.



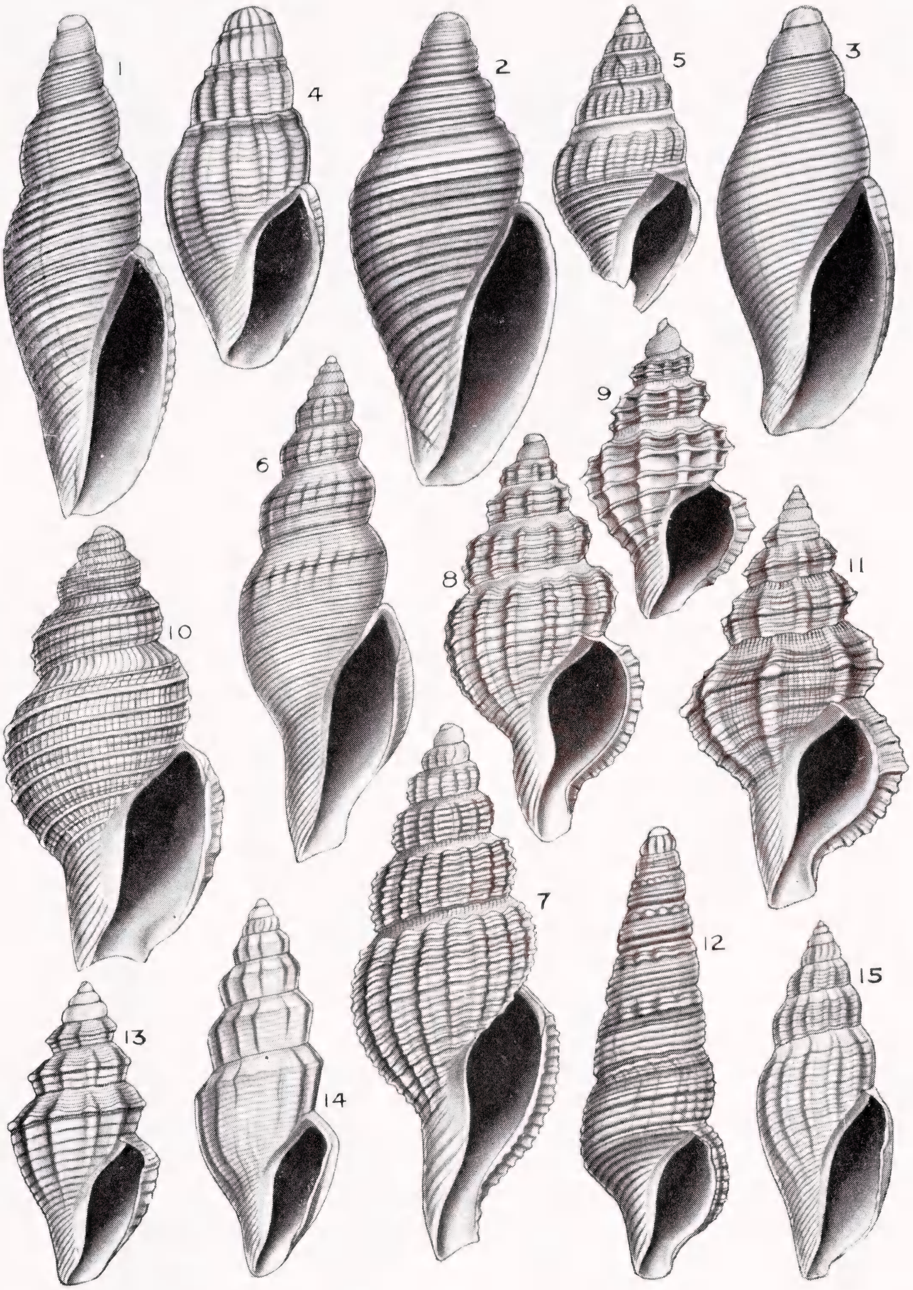
1. *Guraleus chapplei* n. sp. 12.5 x 3.9 mm. 2. *Guraleus janjukiensis* n. sp. 5.75 x 2.7 mm. 3. *Guraleus ludbrookae* n. sp. 7.8 mm. x 3 mm. 4. *Mauidrillia intumescens* n. sp. 18 x 7.5 mm. 5. *Mauidrillia partinoda* n. sp. 8.4 x 3 mm. 6. *Mauidrillia aldingensis* n. sp. 9.5 x 3.8 mm. 7. *Mauidrillia torquayensis* n. sp. 9.1 x 3.9 mm. 8. *Mauidrillia serrulata* n. sp. 9 x 4 mm. 9. *Mauidrillia trispiralis* n. sp. 9.9 x 3.5 mm. 10. *Mauidrillia secta* n. sp. 12 x 4.5 mm. 11. *Heterocithara miocenica* n. sp. 7.9 x 3.5 mm. 12. *Maoritomella balcombensis* n. sp. 9.75 x 3.5 mm. (Holotype figured in every case.)

Plate 5.



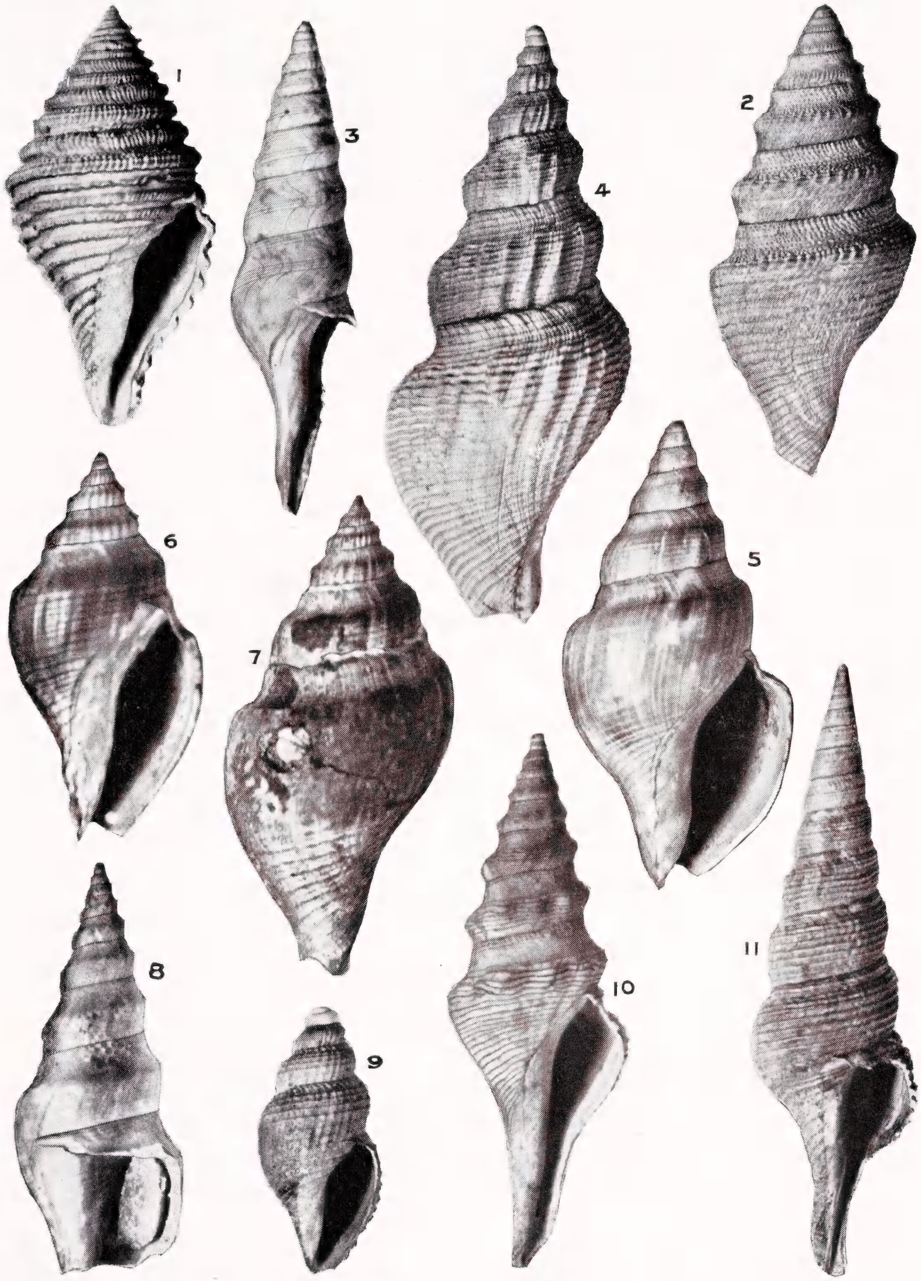
1. *Etrema janjukiensis* n. sp. 5.7 x 2.4 mm. 2. *Etrema gippslandensis* n. sp. 20.5 x 9.75 mm. 3. *Etrema granolirata* n. sp. 6.2 x 2.75 mm. 4. *Etrema exsculpta* n. sp. 8.5 x 3.8 mm . 5. *Etrema mirabilis* n. sp. 17.5 x 7.6 mm. 6. *Etremopsis contigua* n. sp. 4.1 x 2 mm. 7. *Etremopsis opposita* n. sp. 6 x 2.7 mm. 8. *Filodrillia turricula* n. sp. 6.5 x 2.4 mm. 9. *Filodrillia ludbrookae* n. sp. 9 x 3.75 mm. 10. *Anacithara janjukiensis* n. sp. 8 x 3.5 mm. 11. *Guraleus (Paraguraleus) abbreviatus* n. subgen. & sp. 5.9 x 2.5 mm. 12. *G. (Paraguraleus) finlayi* n. sp. 6.95 x 3 mm. 13. *G. (Paraguraleus) balcombensis* n. sp. 8.5 x 3.4 mm. 14. *G. (Paraguraleus) incisus* n. sp. 9.8 x 3.5 mm. (Holotype figured in every case.)

PLATE 6.



1. *Teleochilus balcombensis* n. sp. 18 x 6 mm. 2. *Teleochilus duplicatus* n. sp. 14.1 x 5.1 mm. 3. *Teleochilus comptus* n. sp. 12.7 x 5 mm. 4. *Syngenochilus radiapex* n. gen. & sp. 7.25 x 3.25 mm. 5. *Rugobela exsculpta* n. sp. 7.2 x 3.6 mm. 6. *Daphnella chapplei* n. sp. 12.2 x 4.3 mm. 7. *Asperdaphne balcombensis* n. sp. 11 x 4.25 mm. 8. *Asperdaphne contigua* n. sp. 6.8 x 3 mm. 9. *Asperdaphne (Aspertilla) exsculpta* n. subgen. & sp. 3.9 x 2.15 mm. 10. *Fenestrodaphne pulchra* n. gen. & sp. 6.1 x 3 mm. 11. *Veprecula ? adelaidensis* n. sp. 6.7 x 3.5 mm. 12. *Pseudexomilus caelatus* n. gen. & sp. 11.6 x 3.9 mm. 13. *Guraleus adelaidensis* n. sp. 4.8 x 2.1 mm. 14. *Guraleus singletoni* n. sp. 6.5 x 2.5 mm. 15. *Guraleus harrisi* n. sp. 7.75 x 3 mm. (Holotype figured in every case.)

PLATE 7.



1. *Micantapex perarmatus* n. sp. 35 x 17.2 mm. 2. *Micantapex parri* n. sp. 40 x 17.2 mm. 3. *Optoturris editus* n. gen. & sp. 25 x 6.5 mm. 4. *Liratomina intertexta* n. sp. 44 x 16.5 mm. 5. *Liratomina adelaidensis* n. sp. 32.6 x 16 mm. 6. *Austrotoma inexpectata* n. sp. 22.5 x 11.5 mm. 7. *A. inexpectata*, 28.5 x 13 mm. (paratype). 8. *Zemacies inexpectata* n. sp. 30 x 10 mm. 9. *Belatomina clathrata* n. sp. 17 x 8 mm. 10. *Apiotoma balcombensis* n. sp. 31.3 x 10.6 mm. 11. *Xenuroturris (Veruturris) cochleatus* n. subgen. & sp. 52 x 14 mm. (Holotype figured in every case.)